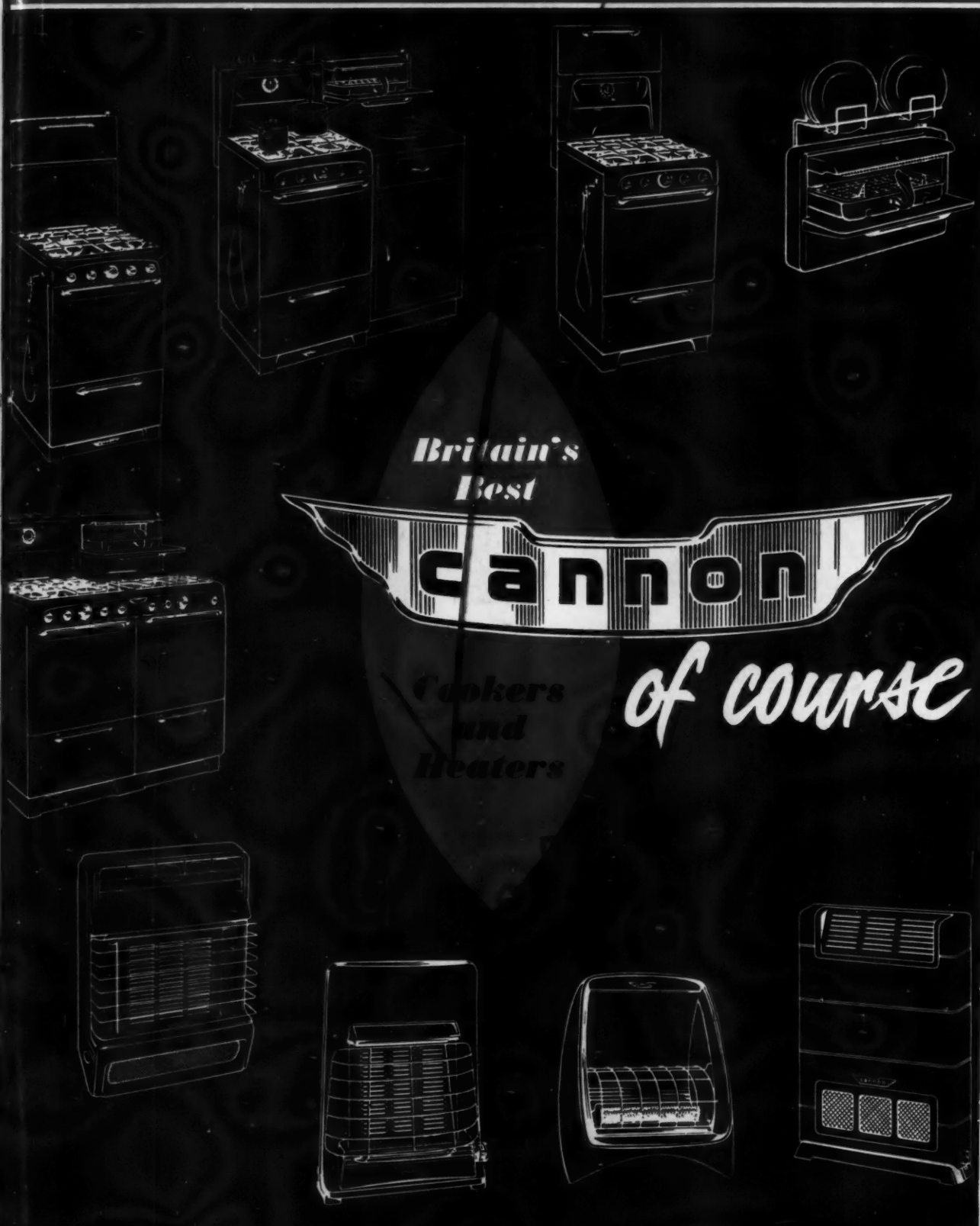
Gas Journal

VOL. 292. 109th YEAR. LONDON, OCTOBER 2, 1957. No 4916. PRICE 1/6



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3,500 BORED PILES

This important Office Building in the City of London, 17 storeys high including the basement floors, is supported on Cementation Bored Piles. Approximately 3,500 were constructed well within the contract time despite the fact that delays were unavoidably occasioned by the deliberations on the fate of the Mithras Temple discovered on the site and other major difficulties inevitable on such a large site.

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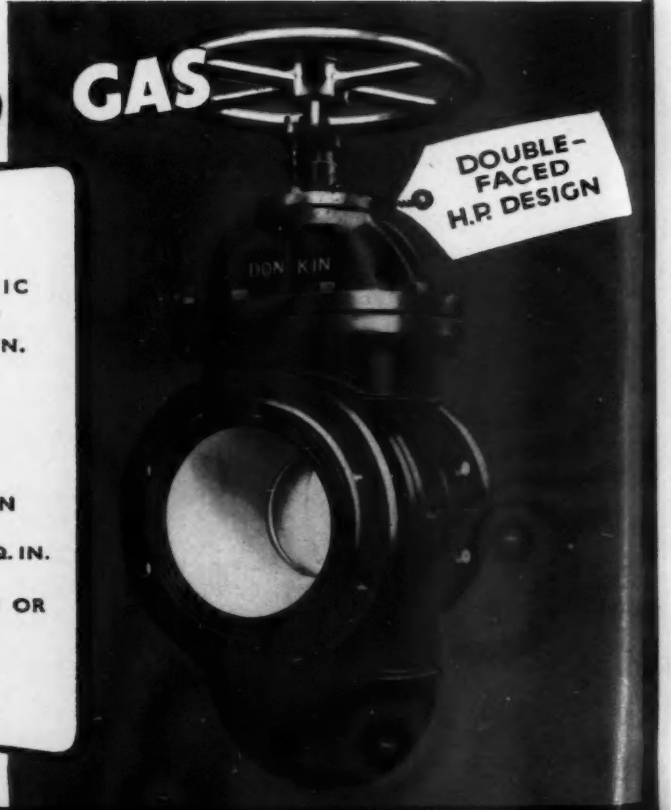

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- STANDARD TEST PRESSURE 100 LBS. PER SQ. IN. AIR.
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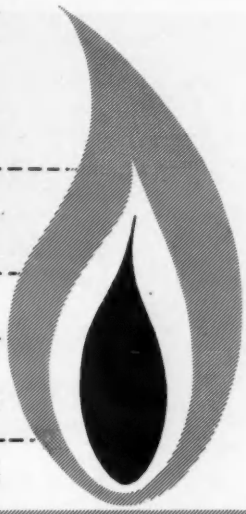

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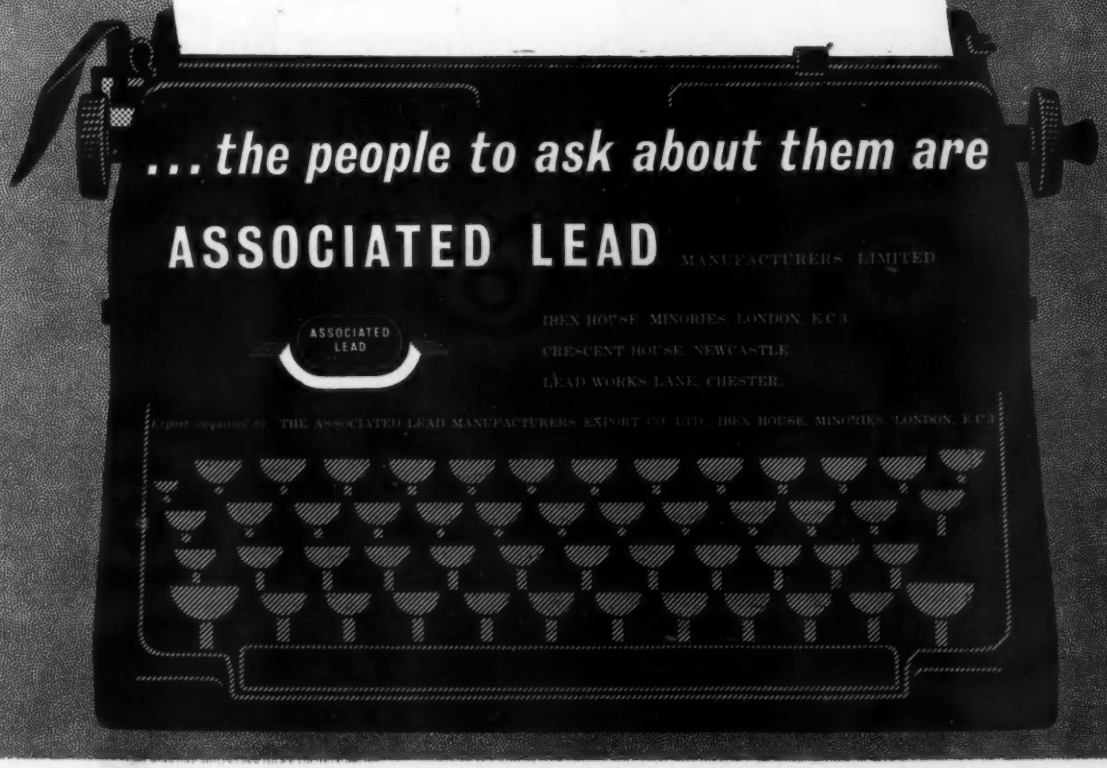

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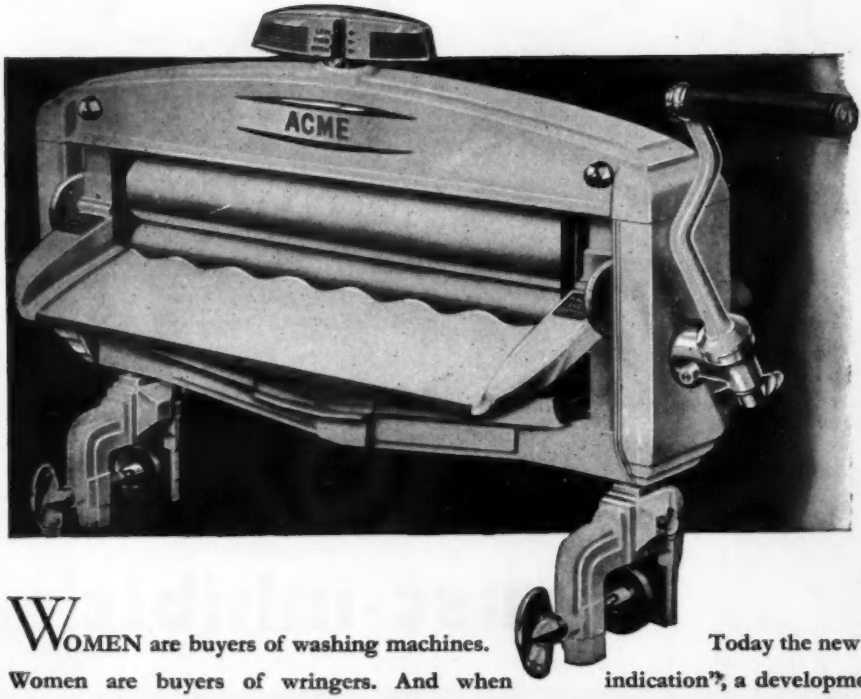
When washing machines are Acme-fitted

then women know they're buying the best...



WOMEN are buyers of washing machines. Women are buyers of wringers. And when women think of wringers they think of the Acme. So when your machines are Acme-fitted your customers know that they must be, like the Acme, the best on the market.

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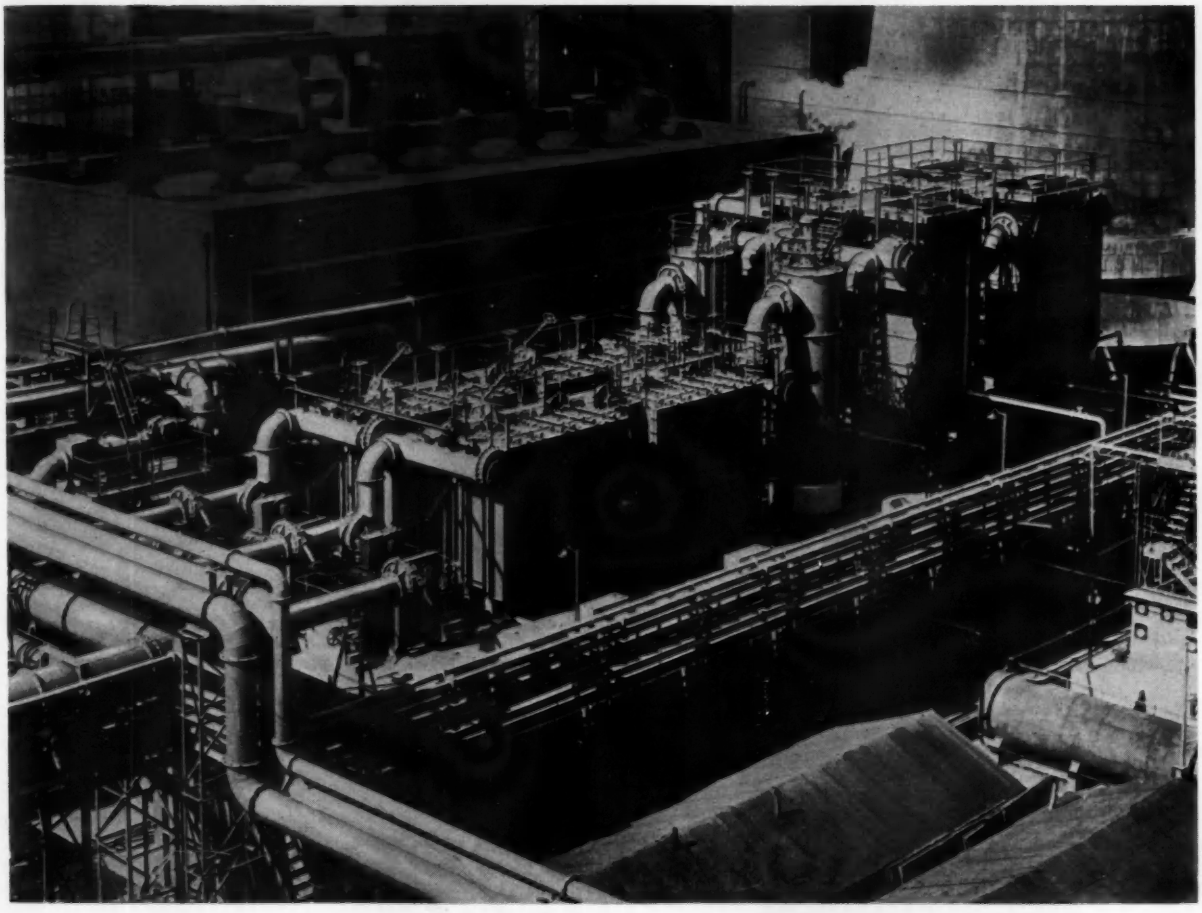
WHESSOE —

AT ROTHERHAM



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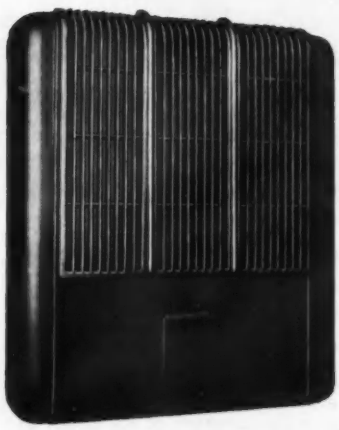

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BALANCED FLUE SPACE HEATER

- Application of patented balanced flue principle eliminates vitiation of interior atmospheres.
- Combines maximum safety with maximum efficiency.
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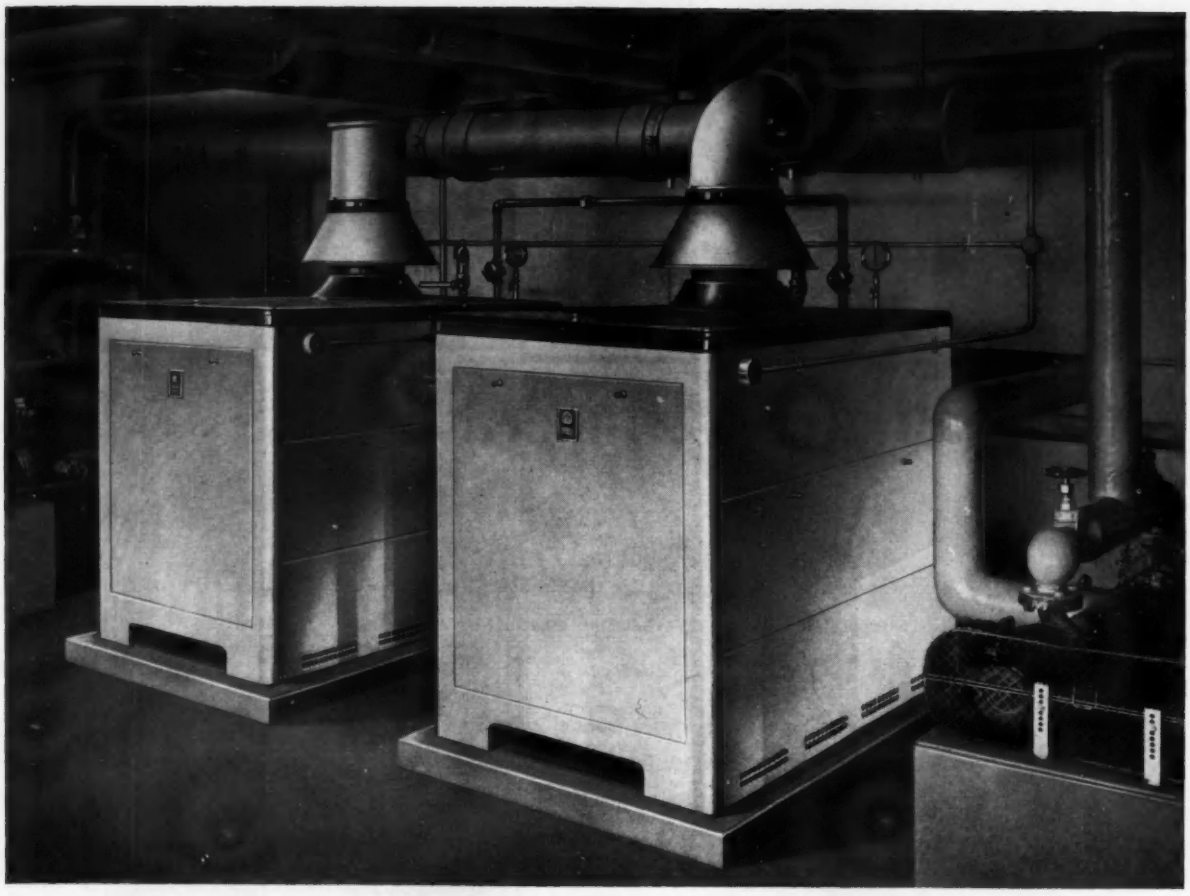

Cleanliness and Efficiency

IDEAL Gas Boilers

Illustrated above are Ideal Gas Boilers installed, for central heating and indirect hot water supply, in the recently completed extension to a hospital.

Cleanliness and a healthy atmosphere are essential to a hospital, and it is therefore important that the heating boilers are fired with a smokeless fuel. In such circumstances, no better choice can be made than Ideal gas-fired boilers. Many years of research work and experience have resulted in the present satisfactory designs.

Ideal Gas Boilers are equipped with complete thermostatic controls, have insulated jackets of steel or aluminium in appropriate finishes and are available in 22 sizes from 20,000 to 1,430,000 B.T.U.'s per hour.

IDEAL-Standard

Foremost for heating and sanitary equipment

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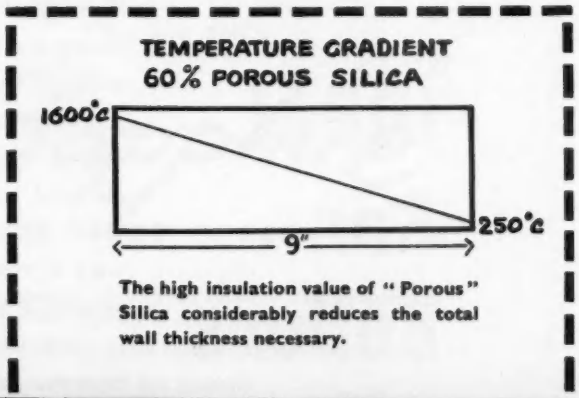
A really high-temperature INSULATION...

- Developed and manufactured by the Consett Iron Company Limited, "Porous" Silica Insulating Bricks have become established as an important addition to the existing range of refractories.
- Possessing the advantages of a normal silica brick combined with high thermal efficiency, "Porous" Silica offers to the furnace builder a spalling resistant silica refractory suitable for hot-face insulation at high temperatures.
- Already in wide use in the glass industry for roof insulation "Porous" Silica Brick is also suitable for the construction of kiln roofs and side walls where its light weight and insulating properties are important factors in design and service.
- "Porous" Silica Bricks are made in two grades, 60% and 50% porosity, the latter possessing a higher mechanical strength, rendering it the most suitable for constructional work.

Further information will be gladly supplied on request.



The high insulation value of "Porous" Silica considerably reduces the total wall thickness necessary.

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SERIES 900

These superior, transistorised, direct-deflection instruments indicate and control temperature with considerable accuracy. Their simplicity of design ensures complete reliability.

TYPE 990 Two-position (on/off) Controller
TYPE 991 Anticipatory Controller
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Equipment of quality

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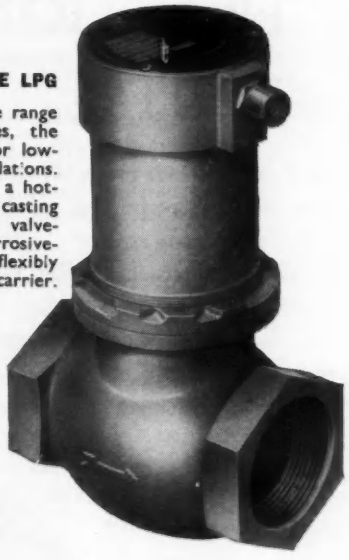
SOLENOID VALVE, TYPE LPG

One of the comprehensive range of ETHER Solenoid Valves, the Type LPG is designed for low-pressure town-gas installations. The valve body is either a hot-brass stamping or gunmetal casting with integrally machined valve-seat. The plunger is of corrosive-resistant ferrous alloy, flexibly connected to a valve-disc carrier. The valve is of the full-pipe-area type and is available in sizes from ⅛in. to 3in. with BSP parallel thread connections.

A'so available, the Type LPGR, a safety shut-off valve with hand re-set feature for low-pressure gas installations.



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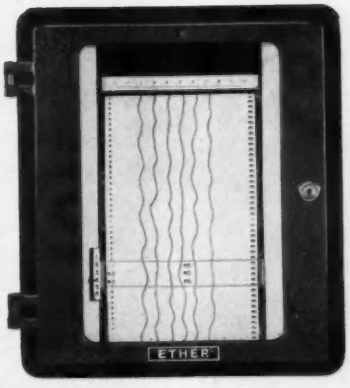

TEMPERATURE RECORDER
TYPE 800

This new RECORDER is designed to record temperatures from 1 to 6 points with complete accuracy. Readings from the various temperature points are distinguished by contrasting colours on a chart which has a calibrated width of six inches and visual length of twelve inches. The chart is re-rolled automatically. The RECORDER is fitted with a new scanner-type commutator, the working life of which exceeds five million revolutions without variation in contact-resistance. The instrument can be calibrated for use with all types of thermo-couples or radiation-tubes.

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THERE ARE NOW over twenty APV plants for the distillation of crude benzoles operating in the United Kingdom—and the number continues to expand.

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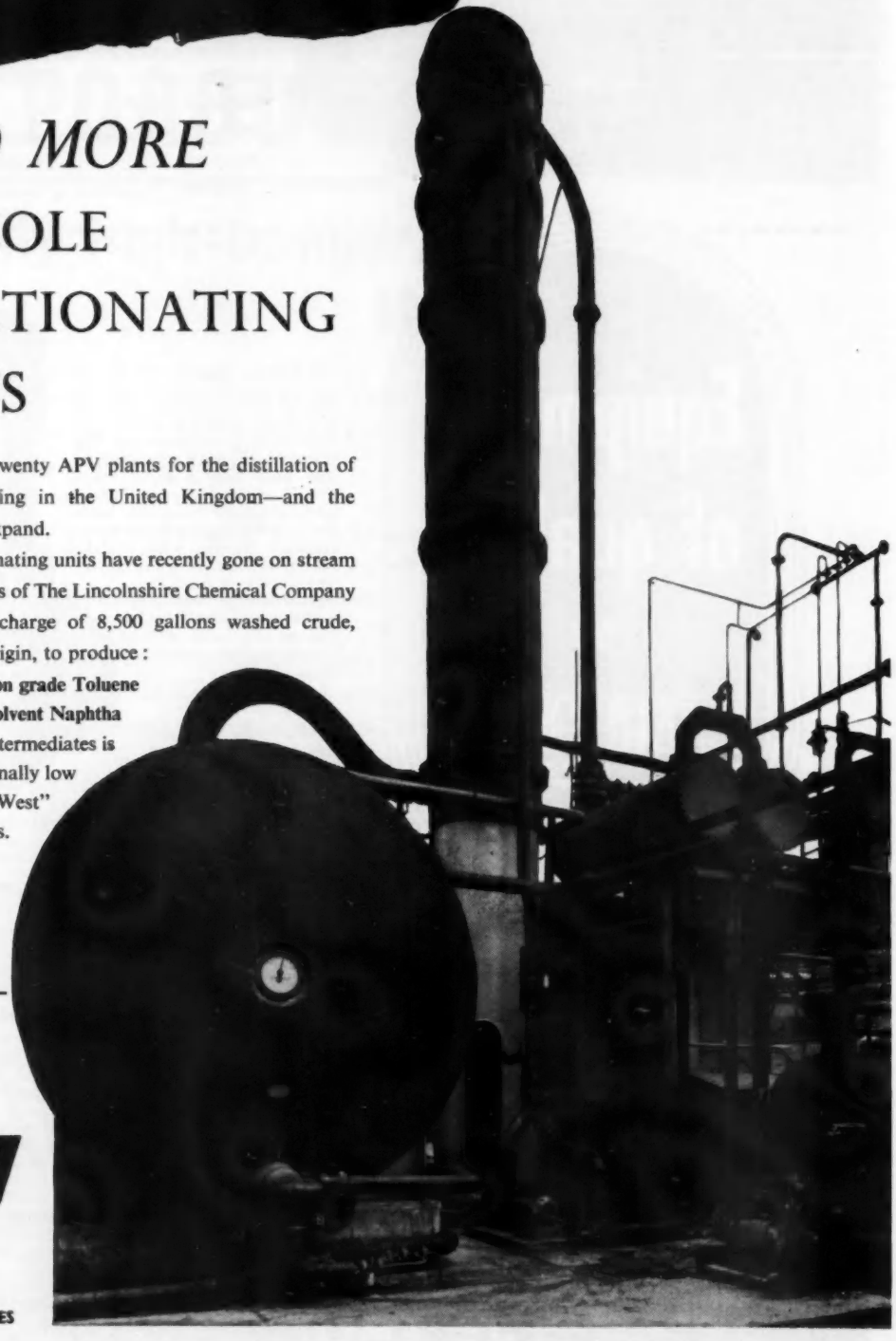
No. 1 Benzole · Nitration grade Toluene
2°/3° Xylole · 96/160 Solvent Naphtha

A minimum make of intermediates is ensured by the exceptionally low hold-up of the APV "West" columns in these plants.



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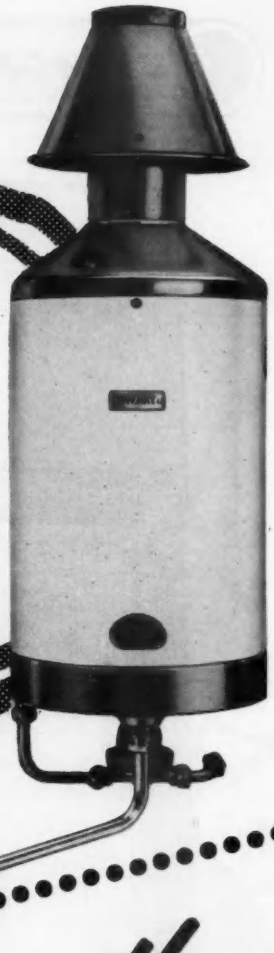
The bath water heater you can really SELL!

the Ewart S.140 AV



The famous Ewart S.140 has always been the lowest priced instantaneous bath water heater on the market. Now, newly re-styled as the Ewart S.140 AV, this easy-to-sell heater is better than ever—and stays as cheap as ever!

Improved manufacturing techniques have enabled Ewart to add to the S.140 these important new features:—

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Display the Ewart S.140 AV in your showrooms. Full details and specification available on request to the manufacturers.

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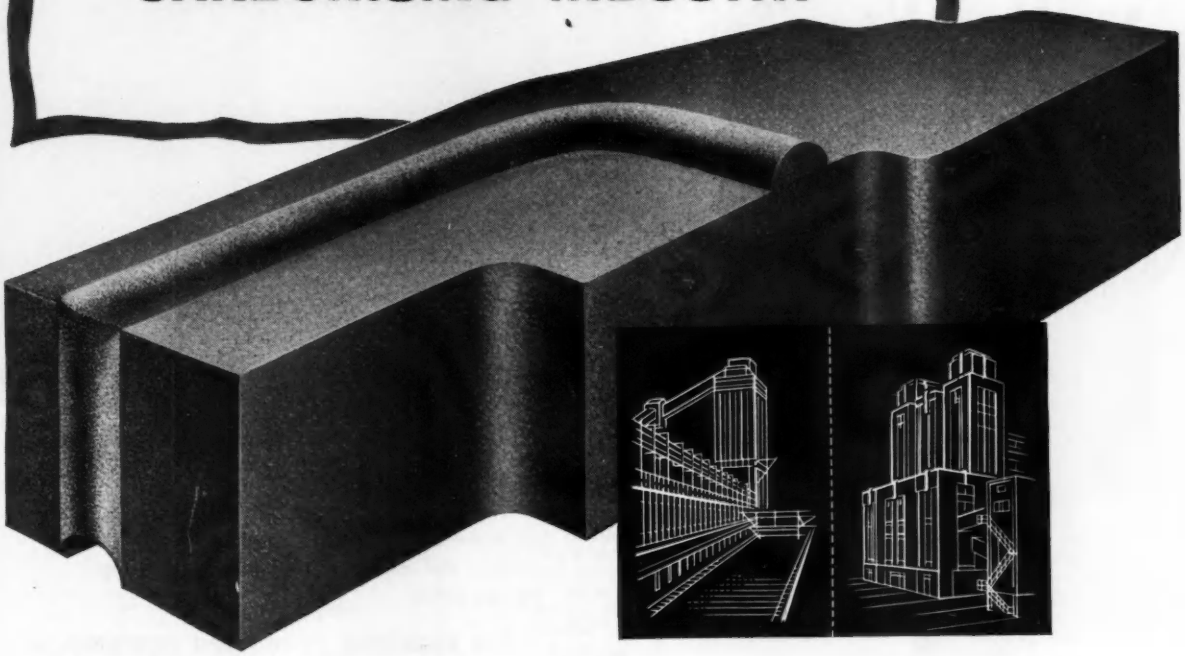

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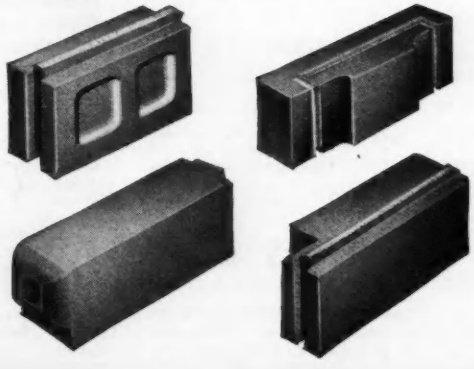

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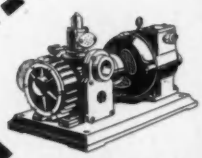

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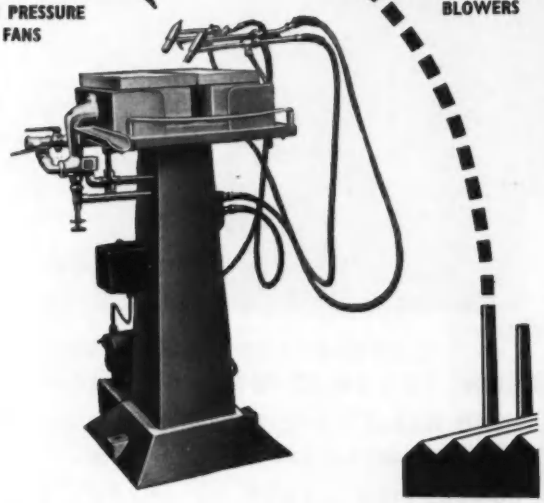

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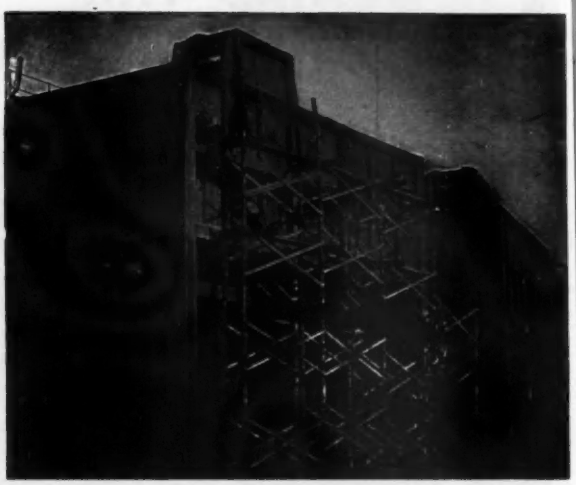

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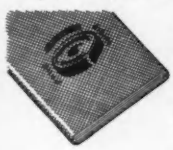

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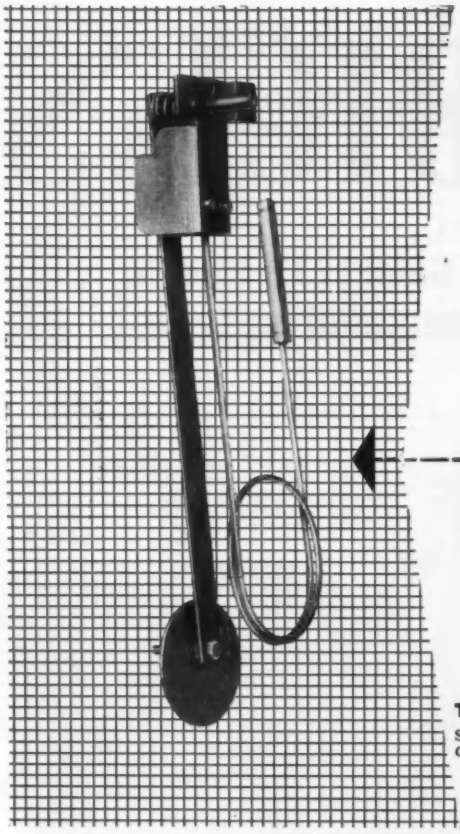

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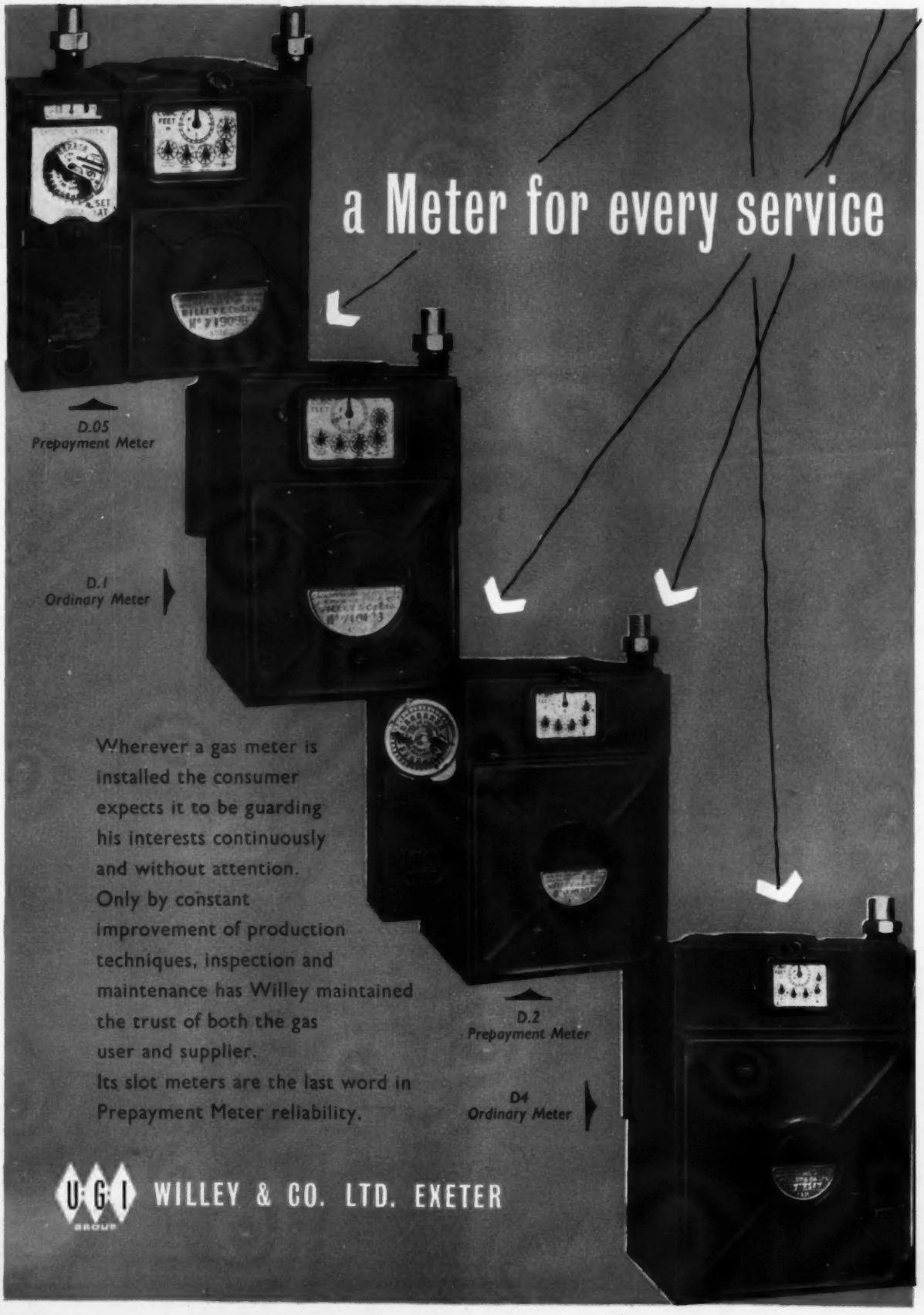
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INDEX TO 'JOURNAL' ADVERTISERS

PAGE

A

A.C.E. Machinery Ltd. ... ...
AEI Lamp & Lighting Co. Ltd. ... ...
A.P.V. Company Ltd. 10
Acme Wringers Ltd. 4
Aerogen Co. Ltd. ... ...
Alder & Mackay Ltd. ... ...
Allan Taylor (Engineers) Ltd. ... ...
Aquafont Industries Ltd. ... ...
Ascot Gas Water Heaters Ltd. ... ...
Ashmore, Benson, Pease & Co. ... ...
Ashworth & Parker Ltd. ... ...
Aspinall's (Paints) Ltd. ... ...
Associated Lead Manufacturers Ltd. 2
Atlas Preservative Co. Ltd. 3
Audley Engineering Co. Ltd. ... ...
Automotive Products Ltd. ... ...
Averill, C. R., Ltd. ... ...

B

B.S.A. Tools Ltd. ... ...
B.T.R. Industries Ltd. ... ...
Bale & Church Ltd. 47
Balfour, Henry, & Co. Ltd. ... ...
Bells Asbestos & Engineering Co., Ltd. ... 46
Berry's Foundry (1949) Ltd. 47
Birtley Engineering Ltd. ... ...
Blakeley, Firth, Sons & Co. Ltd. .. ...
Borchardt, F.A., Ltd. ... ...
Bratt Colbran Ltd. ... ...
Bray, George, & Co. Ltd. ... ...
Bristol Pneumatic Tools Ltd. ... ...
British Carbo-Norit Union Ltd. ... ...
British Gas Purifying Materials Co. 47
British Jeffrey-Diamond Ltd. ... ...
British Paints Ltd. ... ...
British Rototherm Co. Ltd. ... ...
British Thomson Houston Ltd. ... ...
Broadbent, Thomas, & Sons Ltd. ... ...
Brookhirst Switchgear Ltd. ... ...
Broom & Wade Ltd. ... ...
Brown, J., & Co. Ltd. ... ...
Bugden, Thos., & Co. 50

C

Cambridge Instrument Co. Ltd. ... ...
Cannon (G.A.) Ltd. ... ... Cover I
Cementation Co. Ltd. ... ... Cover II
Chemical Engineering Wiltons Ltd. ... ...
Cinema-Television Ltd. ... ...
Clapham Bros. Ltd. ... ...
Clayton, Son & Co. Ltd. ... ...
Clensol Ltd. ... ...
Cleckheaton Engineering Co., Ltd. 47
Clifford Engineering Co. Ltd. 50
Cochrane (Middlesbro') Foundry Ltd. ... ...
Cohen, George, Sons & Co. Ltd. ... ...
Concrete Proofing Co. Ltd. 14
Consett Iron Co. Ltd. 8
Contracts ... ...
Cort, Robert, & Son Ltd. ... ...
County Chemical Co., Ltd. ... ...
Crane Ltd. 50
Crone & Taylor Ltd. ... ...
Crossley Bros. ... ...
Crosthwaite Furnaces & Scriven Mach. Tools Ltd. ...
Cutler, Samuel, & Sons Ltd. 44
Cuxson, Gerrard & Co. Ltd. ... ...

D

Davenport Engineering Co. Ltd. ... ...
Davey, Paxman & Co. Ltd. 20
Davies Bros. (Denton) Ltd. ... ...
De la Rue, Thomas, & Co. Ltd. (Gas Group) ...
Demolition & Construction Co. Ltd. ... ...
Dempster, R. & J., Ltd. ... ...
Dempster, Robert, & Sons Ltd. ... ...
Denison & Son Ltd. ... ...
Derbyshire Silica Firebrick Co. Ltd. ... ...
Diaphragm & General Leather Co. Ltd. ... ...
Dick, R. & J. Ltd.... 15
Donkin (The Bryan) Co. Ltd. ... ... Cover II
Douglas, Wm., & Sons Ltd. ... ...
Drakes Ltd. ... ...
Dresser Manufactures (England) Ltd. ... ...
Drew, H. B., Ltd. ... ...
Drummond Patents Ltd. ... ...

E

Eagre Construction Co. Ltd. ... ...
Electric Construction Co. Ltd. ... ...
Electroflo Meters Co. Ltd. ... ...
Electrolux Ltd. ... ...
Elliott Bros. (London) Ltd. ... ... Cover IV
Ellison, George, Ltd. ... ...
Ether Ltd. 9
Evans (Joseph) & Sons (Wolverhampton) Ltd. ...
Evered & Co. Ltd. ... ...
Ewart & Sons Ltd. 12
Ewart Chainbelt Co. Ltd. 50

F

Fibreglass Ltd. ... ...
Flavel, S., & Co. Ltd. ... ...
Fluidrive Engineering Co. Ltd. ... ...
Ford Motor Co. Ltd. ... ...
Fowler, John. & Co. (Leeds) Ltd. ... ...
Frankie Compressed Pile Co., Ltd. ... ...

PAGE

G

Gas Purification Ltd. 47
General Electric Co. Ltd. ... ...
Gibbons Bros. Ltd. ... ...
Girdex Engineering Co. Ltd. ... ...
Glover, George, & Co. Ltd. 1
Glover, Thomas, & Co. Ltd. ... ...
Godfrey, Sir George, & Partners (Industrial) ...
Goodall Clayton & Co. Ltd. ... ...
Goodyear Industrial Rubber Products Ltd. ...
Grant Lyon & Co. Ltd. ... ...
Graphite Products Ltd. ... ...
Greenwood & Batley ... ...
Green & Boulding Ltd. ... ...
Gunite Construction Co. Ltd. ... ...

H

Hackbridge & Hewittic Electrical Co. Ltd. ...
Hamilton, A. H., & Co. Ltd. ... ...
Harbour & General Works Ltd. ... ...
Hardman & Holden Ltd. ... ...
Harris & Pearson Ltd. ... ...
Harris Engineering Co. Ltd. ... ...
Harrisons (London) Ltd. ... ...
Harvey, G. A., & Co. (London) Ltd. ... ...
Hick Hargreaves & Co. Ltd. ... ...
Hilmor Ltd. 44
Holman, Michell & Co. Ltd. ... ...
Holmes, W. C., & Co. Ltd. 49
Holst & Co. Ltd. ... ...
Hopkinsons Ltd. ... ...
Horseley Bridge & Thomas Piggott Ltd. ... ...
Horstmann Gear Co. Ltd. ... ...
Hudswell Clarke & Co. Ltd. ... ...
Hughes, F. A., & Co. Ltd. ... ...
Humphreys & Glasgow Ltd. ... ...

I

I.C.I. Ltd. (Metals Division) ... ...
Ideal Boilers & Radiators Ltd. 7
Ingham, John, & Sons Ltd. ... ...

J

Jeavons, E. E., & Co. Ltd. ... ...
Jeavons Engineering Co. ... ...
Jenkins, W. J., & Co. Ltd. ... ...
Johnson, C. H., (Machinery) Ltd. ... ...
Joy-Sullivan Ltd. ... ...

K

Keay, E. C. & J., Ltd. ... ...
Kings Patent Agency Ltd. 47
King, Walter, Ltd. 47, 48, 50
Kirkham, Hulett & Chandler Ltd. ... ...

L

Lafarge Aluminous Cement Co. Ltd. ... ...
Land & Marine Contractors Ltd. ... ...
Lamont, James H., & Co. Ltd. ... ...
Le Bas Tube Co. Ltd. ... ...
Lee, Howl & Co. Ltd. ... ...
Lincoln Electric Co. Ltd. ... ...
Lind, Peter, Ltd. ... ...
Lionweld Ltd. ... ...

M

Macpherson, Donald, & Co. Ltd. ... ...
Magnetic Valve Co. Ltd. ... ...
Main, R. & A., Ltd 42, 43
Major Robinson & Co. Ltd. ... ...
Marsh Bros. (Electric) Ltd. ... ...
McNeill, F., & Co. Ltd. ... ...
Meltham Silica Fire Brick Co. Ltd. 13
Metal & Pipeline Endurance Ltd. ... ...
Meters Ltd. ... ...
Metropolitan-Vickers Electrical Co. Ltd. ... ...
Meynell & Sons Ltd ... ...
Midland Iron & Hardware Co. (Cradley Heath) Ltd. 47, 50
Milne (Edinburgh) Ltd. ... .
Mint, Birmingham Ltd. ... ...
Mitchell Engineering Ltd. ... ...
Mitchell, H., & Co. ... ...
Moler Products Ltd. ... ...
Monk, A., & Co. Ltd. ... ...

N

National Benzole Co. ... ...
Nelson, W. & H., Ltd. ... ...
Neville, J. C., Ltd. ... ...
New Conveyor Co. Ltd. ... ...
Newton Chambers & Co. Ltd. ... ...
Norwest Construction Co. Ltd. ... ...

O

Oxley Engineering Co. Ltd. ... ...

PAGE

P

Parkinson & Cowan (Gas Meters) Ltd. 22
Parkinson Stove Co. Ltd. ... ...
Pass, E., & Co. Ltd. 16
Peart, E. & Co. Ltd. ... ...
Peebles & Co. Ltd. ... ...
Perl Controls Ltd. 21
Pickles, Ayland & Co. Ltd. ... .
Plant for Sale ... ...
Plenty & Son Ltd. ... ...
Power-Gas Corporation Ltd. ... ...
Press, William, & Son Ltd. ... ...
Procter Bros. (Wireworks) Ltd. ... ...
Pyrene Co., Ltd. ... ...

R

Radiant Heating Ltd. ... ...
Radiation Ltd. 38, 39
Rawlplug Co. Ltd. ... ...
Reavell & Co. Ltd. 46
Roberts, R. E., & Sons Ltd. ... ...
Robinson, J. H., & Co. (Liverpool) Ltd. ...
Rozalex Ltd. 50

S

Salter, T. E., Ltd. ... ...
Saunders Valve Co. Ltd. ... ...
Sawyer, Geo. E., Ltd ... ...
Scientific & Projections Ltd. ... ...
Senior Economisers Ltd. ... ...
Shaw Petrie Ltd. ... ...
Shell Chemical Co. Ltd. ... ...
Siebe Gorman & Co. Ltd. ... ...
Siemens-Schuckert (Great Britain) Ltd. ...
Sigma Instrument Co. Ltd. ... ...
Simon, Richard, & Sons Ltd. ... ...
Smith & Nephew Ltd. ... ...
Smith Meters Ltd. ... ...
Smith, Thos., & Sons (Rodley) Ltd., ...
Smith, W. H., & Co., Electrical Engineers Ltd. ...
Solus-Schall Ltd. ... ...
Spanner Boilers Ltd. ... ...
Spencer-Bonecourt-Clarkson Ltd. ... ...
Speedwell Gear Co. ... ...
Sperryn & Co. Ltd. 1
Stanton Ironworks Co. Ltd. ... ...
Staveley Iron & Chemical Co. Ltd. 18
Stein, John G., & Co. Ltd. ... ...
Stewarts & Lloyds Ltd. ... ...
Stillite Products Ltd. ... ...
Stoves Ltd. 11
Strachan & Henshaw Ltd. ... ...
Stringer Bros. ... ...
Sugg, Wm., & Co. Ltd. 6
Sutcliffe Speakman & Co. Ltd. ... ...
Sutherland, A. G., Ltd. ... ...

T

T & T Works Ltd. ... ...
Tangyes Ltd. ... ...
Teddington Refrigeration Controls Ltd. ... 16
Thorp, Thomas, & Co. Ltd. ... ...
Turners Asbestos Cement Co. Ltd. ... ...

U

Underpressure Engineering Co. Ltd. ... ...
United Gas Industries Ltd. 17
United Kingdom Construction and Engineering Co. Ltd.

V

Vaughan, Edgar, & Co. Ltd. ... ...
Vauxhall Motors Ltd. ... ...
Victaulic Co., Ltd.... ... ...
Visco Engineering Co. Ltd. ... ...

W

Wakelin, F. H., Ltd. 47
Walker Bros. Ltd. ... ...
Walker, C. & W., Ltd. ... ...
Walkers (Century Oils) Ltd. ... ...
Waller, George, & Sons Ltd. ... ...
Walter King Ltd. 47, 48, 50
Ward, Thos. W., Ltd. ... ...
Weir, G. & J., Ltd. ... ...
Wellington Tube Works Ltd. ... ...
West's Gas Improvement Co. Ltd. ... Cover III
West's Piling & Construction Co. ... ...
Westwood & Wrights Ltd. 50
Wheesoe Ltd. 5
Whitehouse, Wm., & Co. Ltd. ... ...
Whitley Moran & Co. Ltd. ... ...
Whitlock Bros. Ltd. ... ...
Wilkes, A. H., & Co. Ltd. 14
Williamson, Cliff, Ltd. ... ...
Wilson, George, Gas Meters Ltd. ... ...
Winn & Coales Ltd. ... ...
Woodall-Duckham Construction Co. Ltd. ... 37
Wood, Hugh, & Co. Ltd. ... ...

Y

Yorkshire Copper Works Ltd. ... ...

Agencies 47
Appointments Vacant 47, 48
Appointments Wanted ... ...
Books ... ...
Contracts Open 47
Educational ... ...
Fellowship ... ...
Patents 47
Plant &c. For Sale 47
Plant Wanted. ... ...
Publications ... ...
Publishers Notice ... ...

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Gas Journal

VOL. 292 NO. 4916 October 2, 1957

109TH YEAR

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CONTENTS

Page

EDITORIAL COMMENT

Where Do We Go From Here? 23
Efficiency Through Economy 24

NEWS OF CURRENT EVENTS

Personal 25
Obituary 25
Diary 25
C.E.A. Publishes Final Account 25
British Coke Men Visit U.S. 25
Cumberland Gas Grid Opened 26
New Ipswich Holder Goes Into Service 27
Scottish Association of Gas Managers Holds Annual Meeting .. 29
Filming Amines Overcome Corrosion 40
Eastern Juniors Hold Presidential Meeting 46

TECHNICAL RECORD

Brickwork Construction and Maintenance in Shell Type Boiler Installations. By A. R. Myhill 41

PUBLISHERS' NOTICE, SEE PAGE 47

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Gas Journal

VOLUME 292. No. 4916. OCTOBER 2, 1957. 109th YEAR

Where Do We Go from Here?

IN an energy starved world there must always be at the back of the mind of those responsible for our industrial effort the worry of where the necessary fuel to maintain and, if possible, to accelerate, the speed of our industrial output is going to come from. This is particularly true in Britain where the rate of industrial activity has increased so quickly since the end of the war. Before the war, with unemployment rife, our industrial machine was if anything running below capacity and the source of all the fuel necessary to keep it going was on the doorstep. There was plenty of coal in the ground and more than enough manpower to raise it to the surface. Now all that has changed. Industrial activity is running at top speed, and even accelerating. The output of heavy industry is running at record heights and the exports of finished products are being stepped up to pay for our necessary imports. The Continent of Europe too has increased its rate of production so that any external sources of fuel must be shared or competed for among ourselves and our neighbours. In these circumstances it is most appropriate that the subject chosen for the 1957 William Young Memorial Lecture by Mr. Ernest West should have been 'Fuel Problems of Today and Tomorrow.' As he points out, the world is being faced with what might seem to be several problems almost incapable of solution. In the first place the population of the world is rapidly increasing. It has been estimated that at the beginning of the Christian era, the population of the world was 300 mill.; today it is 2,500 mill.; and at the present rate of increase, in the year 2000 it will be 7,000 mill. That is to say, in less than 50 years' time world population will have almost trebled. More people will have to be fed, clothed *and* kept warm. But the rise in standards of life all over the world is going to make even greater demands on the available resources. Food will have to be grown in greater quantity and, in addition, better living accommodation must be found and extra consumer goods manufactured. This high standard of life means the greater and still greater consumption of energy; this will be particularly true in what are now known as the underdeveloped countries. In this country, Mr. West points out, we must therefore make even greater efforts to become less dependent on outside sources of energy. Oil from the Middle East or the Western Hemisphere may be all very well at the moment, but as the need for it by others increases and the political dangers which make dependence on an overseas source of energy a matter of uncertainty, continue to give anxiety, so will our industrial enterprise become curtailed.

To overcome such difficulties our coal supplies need to be exploited to the utmost, not as a source of crude fuel, but as a raw material for refined fuels and chemical synthesis. The present cost of gas is probably discouraging the poorer domestic consumer from using as much of it for cooking and space heating as he should, although the extra convenience and ease to the harassed housewife should far outweigh this extra cost over the dirt and dust of solid fuel appliances.

The damage from a smoke-ladened atmosphere to health and buildings (far the greatest quantity of smoke comes from domestic chimneys) is costing the country many millions of pounds every year, and it will go on doing so until the Clean Air Act really becomes effective. The stocks of coke being held in the country are abnormally high at present, but Mr. West thinks this is deceptive, and points out that sooner or later all sources of smokeless fuel will be in demand. He recommends the doing away with coke as a fuel and substituting in its place the utilisation of gas and electricity for providing all heat requirements. Why move quantities of coke around the countryside when it can be gasified either separately in a water gas plant or in one operation in a complete gasification plant? Industry, too, would gain by the increased use of gas heating. It is reasonable to suppose that there might indeed be an increase in the demand for gas by all types of consumers, if its price could be lowered. Many new processes are being tried out and much research on the matter is in progress. Complete gasification either by cyclic means such as the coal water gas plant which is slowly coming into favour, by hydrogenation or by pressure gasification, should reduce the cost of gas production since non-caking coals may be used. If the production of gas is on a large enough scale the price per therm from hydrogenation and high pressure Lurgi processes should be favourable, but in most cases their commercial success relies on a very cheap raw material—lignite in

Germany or brown coal in Australia. Other methods, such as the carrier-gas method of carbonisation, are mentioned by Mr. West, and these certainly make for cheaper gas, but in this particular case the carrier-gas has to be made in a separate plant. If the external heating of coal could be dispensed with altogether and 'contact heating' could be applied, coal could be carbonised at 600°C., at a greatly reduced cost.

Perhaps Mr. West's boldest suggestion is that the gas industry should co-operate with the electricity industry and build their plant on the same or on adjoining sites. This would enable the power station boilers to be fired by high pressure gas made on the spot and as part of a very large gas making plant. Complete smokelessness would be combined with the highest possible utilisation of our own fuel resources. With the use of atomic energy increasing at its present rate such a scheme if universally adopted might at least keep our demands for oil stationary, even if they are not reduced appreciably. We would certainly have the satisfaction of thinking that the increase in energy demands were being met by our own coal resources.

Efficiency Through Economy

IN his Presidential Address to the Eastern Juniors, Mr. J. L. Ireland, puts forward some interesting points in his attempt to answer the question which so many in the gas industry are asking themselves: 'Why is it that gas is ceasing to be competitive among domestic consumers?' He quotes from the Ridley Committee's report 'For some purposes—primarily lighting and power—electricity is uniquely suited and practically irreplaceable; for other purposes—such as space heating, water heating and cooking—it competes with all other fuels and could easily be replaced as it is generally incompatible with the national interest.'

What is the matter with gas? In its own particular sphere of usefulness it has all the advantages of electricity with greater convenience of handling, a more intense and concentrated heat and an equal heating efficiency, together with the official blessing of those trying to make the very best use of our own fuel resources. Mr. Ireland thinks that costs of production and costs of maintenance schemes have much to do with the growing indifference to the domestic use of gas and the turn to electricity.

The coming of nationalisation made possible the compulsory integration of the many small gas manufacturing and distribution units that were operating completely independently. Here were immense possibilities for economy and increases in efficiency. The manufacture of gas in larger units and the integration schemes of the area boards have had an enormous effect on the price of gas to the consumer. In fact it is reasonable to suppose that without some such integration of the many small undertakings the gas industry would have really gone out of business and its many critics and evil wishers would have been right for once. But it seems that something else must be done. The efforts of the past eight years were made just in time for they were able to stabilise a situation which was fast getting out of hand. Unfortunately, however, it seems that the financial conditions in the country are outrunning the provisions that have been made for the economic working of the industry and the bringing into fruition of the many schemes which would increase the demand for gas at the expense of electricity.

Mr. Ireland points to a possible solution by raising the efficiency of gas manufacture from the admittedly high average of 76 therms of gas and coke produced for the expenditure of 100 therms of coal. Expert opinion has it that this might be raised to 85 to 90 therms which would once more restore gas to its competitive position. It would seem that some quite revolutionary type of process would be necessary to accomplish this. Will it be the hydrogenation process now under experiment by the North Western Gas Board? Will it be gas making by the use of atomic energy? Or will it be by the importation of natural gas? Whichever process proves to be the correct one, it does seem that something needs to be done as quickly as possible.

After the cost of production has been reduced to a figure far below what it is now, the quality of gas must be improved to allow the use of flueless heaters. The particular aspect of gas quality to be examined is of course the organic sulphur content. This should be made a matter of top priority in the gas industry's programme.

Although the absolute content of organic sulphur is small, for that reason it can be comparatively costly to remove, but since nearly half the complaints of the performance of water heaters are caused by sulphur corrosion and the use of flueless gas heaters is so limited by the unpleasantness of the flue gases, even at 1d. per therm this particular aspect should be given far more attention. It is under these two headings that gas can compete directly with electricity and win. It is of interest to quote Mr. Ireland's figures on this point. He points out that the Royal College of Physicians considers that 1 p.p.m. is the maximum proportion of sulphur which should be allowed in the combustion products of town gas when burnt fluelessly.

The gas industry as a whole must take its place in the economy of the country and realise that by becoming 'big business' it must assume all the responsibilities that such a status brings with it. No longer is it a small enterprise financed out of capital raised by a few far sighted business men for their own benefit and for the benefit of their small local community. This the present generation of gas engineers and others engaged in the industry are recognising, a fact which is clearly shown by the up-to-date methods of heat conservation and management methods which have been introduced into the industry in the course of the last few years. But something else seems necessary in the top positions and that would appear to be the commercial instinct to handle and put before the domestic public the advantages to be gained from the use of a gaseous fuel produced under such modern conditions. Nor should service to the consumer be forgotten, for the service man is the real liaison officer between the industry and the public. He can talk the same language as the consumer and encourage the housewife to visit the showroom. He can keep the water heater or cooker in tip-top condition.

One last point. It is amusing to find Mr. Ireland advocating high pressure salesmanship—a commodity which has been scorned by the gas industry for years. Of course he is right.

Personal Notes

MR. A. F. PEART has been appointed Manager of the London offices, 28, Victoria Street, Westminster, S.W.1, of V. L. Farthing & Co., Ltd. Mr. Peart will also be responsible for the interests of Vernon Engineering Co., Ltd., and Veco Products, Ltd., of Liverpool and Manchester, undertaking technical sales for Ashworth & Parker, Ltd., Whittaker Hall & Co., Ltd., Maxim Silencers, Ltd., and Vernon Engineering Co., Ltd.

MR. A. M. TAYLOR, Secretary and Commercial Manager of Foster Transformers, Ltd., Wimbledon, Surrey, has been appointed a Director of the Company. Mr. Taylor, who joined the Lancashire Dynamo Organisation in 1948, has been Commercial Manager of the Foster Company since that time, becoming Secretary of that Company in 1953; he is also Secretary of Foster Electrical Supplies, Ltd.

MISS M. G. MITCHELL has been presented by the Directors of British Belting and Asbestos Ltd., of Cleckheaton, Yorkshire, with a refrigerator to mark her retirement after 44 years' service with the firm. Her colleagues presented her with a gold watch and a tea and dinner service.

MR. F. J. PAINTER, who went to Doncaster in September, 1942, as Works Chemist, and has latterly been Deputy Engineer, has been appointed Group Engineer at Grimsby.

MR. R. E. CHANDLER, a sales superintended with the West Bromwich branch of the West Midlands Gas Board, has been appointed Service and Sales Manager for the Dundee group of undertakings of the Scottish Gas Board.

Obituary

MR. HORATIO WALLETT, B.E.M., Mains Superintendent for the Bilston area of the West Midlands Gas Board, has died aged 73.

Distributors Appointed

Elliot Equipment Ltd. (one of the B.P. Cow Group of Companies) have appointed Cory Brothers & Co. Ltd. (one of the Powell Duffryn Group of Companies) as sole distributors in the United Kingdom.

C.E.A. PUBLISHES FINAL ACCOUNT

Nine Years' Successful Operation Nears End

THE Central Electricity Authority, which ceases to exist at the end of this year when its place will be taken by two new bodies set up under the terms of the Electricity Act, has published its final account and record of the past nine years.

In each of those years it has earned an overall surplus, the Authority and the 12 area boards showing a surplus in the last financial year of £11.7 mill., some £½ mill. less than the previous year, while surpluses for the whole period since 1948 have totalled £82.4 mill.

The results of the nine months ending on December 31 this year will show a deficit since the bulk of the industry's revenue is derived from the peak periods of demand in the December and March quarters. The C.E.A.'s record, however, shows that the industry has paid its way.

How the industry will meet the new situation created by the Government's decision to reduce on capital expenditure will be watched with interest by the gas industry.

BRITISH COKE MEN TO STUDY U.S. DEVELOPMENTS

A DELEGATION of the British Coke Research Association left recently for a comprehensive tour of investigation in the United States. The delegation is led by Mr. Leslie O'Connor, Chairman of the British Coke Research Association, Director and Deputy Chairman of the British Coke Industry Association, and Mr. G. W. Lee, Director of the British Coke Research Association.

Others in the team are Mr. M. D. Edington, Mr. G. A. Hunter, Mr. J. L. Lambert, and Mr. J. P. Graham.

The team will study American developments since the last delegation to the U.S. ten years ago, and in particular general design of coke oven and ancillary plant.

Change of Address

The business of technical consultancy hitherto carried on in the name Tekon from 50, Baker Street, W.1, is now being continued in his own name by Mr. T. B. V. Hirst at 9, St. Andrew's Mansions, Dorset Street, London, W.1. Telegraphic address Tekon Wesphone London and telephone WELbeck 6175 are transferred to the new address and an Ipsophone will record incoming calls, day or night, if Mr. Hirst is not available.

Diary

October 3.—NORTH OF ENGLAND SECTION, I.G.E.: 'Some Engineering Problems in connection with the Industrial Application of Nuclear Energy,' by Dr. A. T. Bowden. New Lecture Theatre, Pilgrim Street, Newcastle-upon-Tyne, 2.30 p.m.

October 3.—SOCIETY OF ENGINEERS: Visit to South Eastern Gas Board's East Greenwich Station, 10 a.m., followed by luncheon and visits to local places of historic interest.

October 5.—SOCIETY FOR ANALYTICAL CHEMISTRY: Discussion on 'The Analysis of Trade Effluents,' opened by J. G. Sherratt. Engineers' Club, Albert Square, Manchester.

October 5.—EAST OF SCOTLAND JUNIOR GAS ASSOCIATION: Presidential Address, J. M. Brown. Social Club Rooms, Albany Street, Edinburgh, 3 p.m.

October 7.—INSTITUTION OF CHEMICAL ENGINEERS: Papers on bursting discs by H. R. Wright, T. B. Philip, and J. W. F. Brown. Sir Hugh Beaver will take the chair.

October 8.—MIDLAND JUNIORS: West Midlands Gas Board Staff Mess Room, Council House, Birmingham. Presidential Address.

October 11.—SOCIETY OF ENGINEERS: Annual Dinner in the House of Commons (by courtesy of E. Partridge, C.B.E., M.P.). Reception 6.30 for 7 p.m., followed by conducted tour of the Houses of Parliament before dining at 8 p.m. Principal Guest: Sir Harold Smith, Chairman of the Gas Council.

October 11.—LONDON JUNIORS: Prize giving for 1956-57 session, induction of new President and Presidential Address.

October 16.—WALES & MON. JUNIORS: Paper by K. R. Edwards, Barry.

October 16.—EASTERN SECTION, I.G.E.: Visit to new factory of Vauxhall Motors, Ltd., Dunstable.

October 16.—SOUTH WESTERN SECTION I.G.E.: A.G.M. and Chairman's Address.

October 18.—MIDLAND SECTION, I.G.E.: Visit to the Staveley Iron & Chemical Co., Ltd., near Chesterfield. 10.45 a.m. 'Some Aspects of and Recent Developments in Plant for the Compression of Gas on Distribution Systems,' by R. W. Nelson. 3 p.m.

October 21.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2. 11 a.m.

October 21.—NORTHERN G.C.C.: Gas Board Offices, 30, Grainger Street, Newcastle-upon-Tyne. 11.15 a.m.

November 5 and 6.—COMBUSTION ENGINEERING ASSOCIATION: A study in detail of N.I.F.E.S. third progress survey. Old Swan Hotel, Harrogate.

HISTORIC OCCASION AT CARLISLE

Sir Robert Chance, Lord Lieutenant of Cumberland, tightens the last nut at the opening of the Cumberland gas grid. On his right is Councillor I. Burrow, Deputy Mayor of Carlisle; while on his left Sir Harold Smith, Chairman of the Gas Council, watches with Mr. E. Crowther, Northern Gas Board Chairman, and Mr. J. E. White, his Deputy.

Official Opening of Cumberland Gas Grid

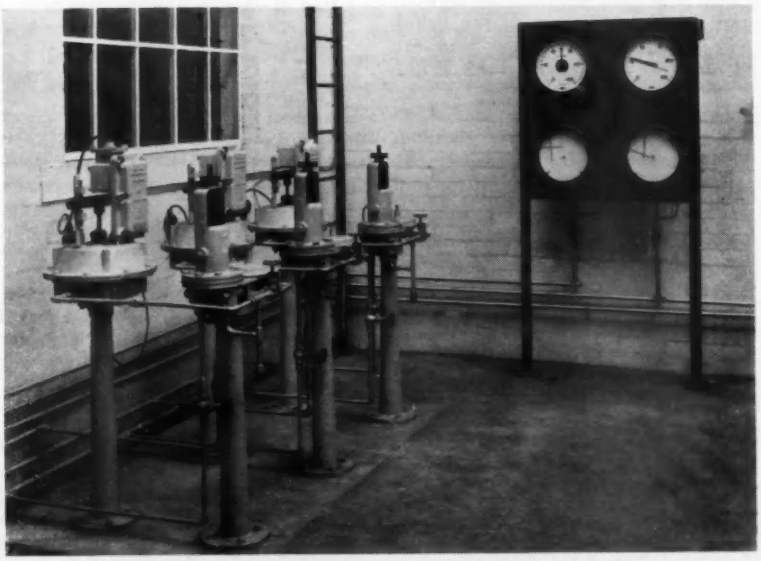
TIGHTENING the last nut for the official opening of the Cumberland gas grid at Carlisle, recently, Sir Robert Chance, Lord Lieutenant of Cumberland, said the occasion was an historic one for the county.

The sad years of the '30s had shown a drop in demand for gas and in investment, and the run-down had caused the gasworks to be unable to meet demand. Prior to nationalisation there had been an independent survey which had said that gas supply could be efficient only by means of an integrated supply. Within a very short time they were buying gas from the coke ovens at Workington, had laid 70 miles of main, built three new gasholders and extended the works at Carlisle. All gas in Cumberland now came from either the coke ovens at Workington (United Steel) or from the coal or oil gas plants at Carlisle.

All Demands Met

After the luncheon Mr. E. Crowther (Chairman, Northern Gas Board) welcomed the guests. He mentioned Sir Robert Chance's long association with the gas industry as Chairman of the Carlisle Gas Company and thanked Sir Harold Smith, Chairman of the Gas Council, and Mr. Owen Francis, Ministry of Power, for travelling so far. He said that during the last eight years 100 miles of main had been laid and there was now sufficient production of gas to meet all demands for many years. Despite the closing down of works there had been no hardship to any employees. An agreement with Workington Iron & Steel Co. was essential to the working. Mr. Crowther then presented the spanner to Sir Robert. This was cleverly placed into a silver candlestick as a souvenir of the occasion.

Sir Robert thanked Mr. Crowther and proposed the toast of the Gas Industry, to which Sir Harold Smith replied.



Governor Control Equipment, Whitehaven.

Eastern Gas Board Puts New 2 mill. cu. ft. Capacity Holder into Service at Ipswich

OFFICIAL OPENING CARRIED OUT BY DEPUTY CHAIRMAN

THE new 2 mill. cu.ft. capacity holder erected at Ipswich by the Eastern Gas Board was opened last week by Mr. J. H. Dyde, Deputy Board Chairman.

The holder has been built on a new site acquired for the purpose in the western outskirts of the town where it forms a convenient centre for low pressure distribution to developing areas. It is also alongside the spine main of the Ipswich Division grid and can be used to balance the demand on that system. Provision has been made for the future installation of compressors to feed gas back into the grid when the loads on the system justify.

Provision for Extension

The main feeding into the holder is a 10 in. branch from the high pressure system and a 24 in. main supplies the district. Provision has been made for additional outlet mains.

The holder will be unattended and remotely controlled from Ipswich gasworks. A station governor is situated above ground in the open and most of the electrical equipment is housed in a building where flame-proof precautions are not necessary.

Constructed by Newton Chambers, the holder is of the water sealed, spirally guided type with four lifts in an above ground steel tank. The whole is of riveted construction and to makers' standard dimensions. The four-lift design was selected owing to its appreciable advantage in cost compared with three-lift construction.

Dimensions and Pressures

The dimensions and pressures thrown are:—

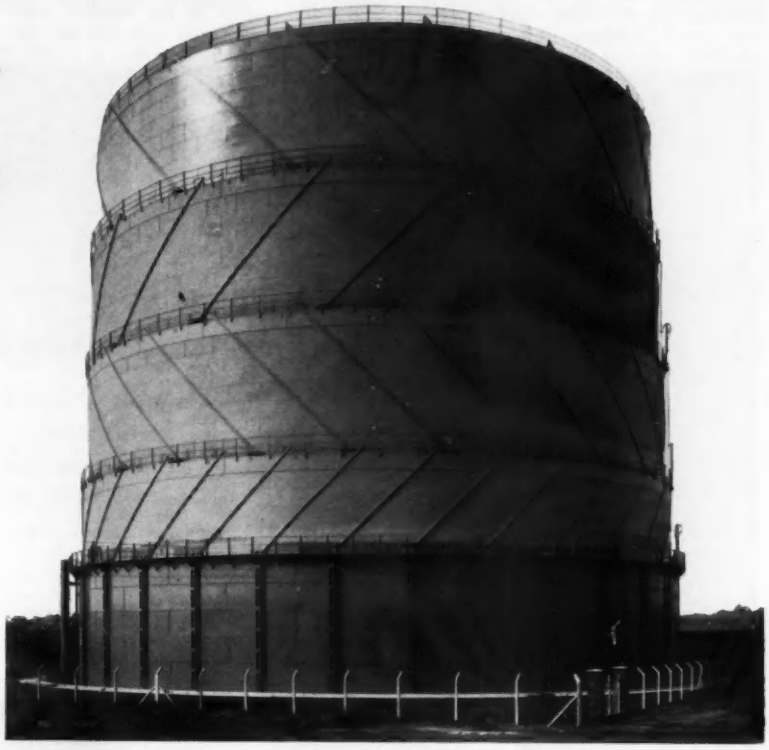
Inner lift, 141 ft. 9 in. diameter by 31 ft. 8 in. deep; pressure thrown, 6.3 in. W.G.

Second lift, 144 ft. 6 in. diameter by 31 ft. 8 in deep; pressure thrown, 9.2 in. W.G.

Third lift, 147 ft. 3 in. diameter by 31 ft. 8in. deep; pressure thrown, 12.5 in. W.G.

Outer lift, 150 ft. diameter by 31 ft. 8 in. deep; pressure thrown, 15.4 in. W.G.

Steel Tank, 152 ft. 6 in. diameter by 32 ft. 4 in. deep.



General view of the new holder at Ipswich showing control building in the background, right.

The crown framing has 32 main rafters and tension bars with 32 intermediate secondary rafters. The crown sheets are riveted to 11 rings of angle purlins bolted to the main and secondary rafters. Four sets of horizontal wind framing are provided, each extending over 2 bays of main rafters, arranged at four points spaced equidistantly around the crown.

The number of vertical stays to each lift is—inner, 32; second, 32; third, 36; and outer, 48. When at rest the holder is supported on 64 rest blocks, fixed to the tank bottom, and a centre lattice pier.

The spiral guide rails are of 55 lb. per yard section riveted to 12 in. by $\frac{3}{8}$ in. spiral plates inserted in the side sheets. There are 32 spiral guide carriages bolted to the tank platform, 24 to the dip of the outer lift, 16 to the dip of the third lift and 16 to the dip of the second lift.

Recommendations Adopted

The carriages are formed with cast steel bodies each fitted with turned steel rollers forged in one piece with the axles. The rollers are equipped for grease lubrication and arranged for circumferential adjustment only but with a radial float of 1 in. The design of these carriages took cognizance of the recommendations of Mr. F. M. Birks in his paper to the Institution of Gas Engineers in 1946.

Gas connections to the holder are 24-in. diameter with antiflood pipes fitted to both inlet and outlet mains.

The holder is sited on a worked out gravel pit afterwards used as a Corporation refuse tip. A preliminary site survey was carried out by Pre-Piling Surveys Ltd., and the depth of fill and bearing qualities of the ground ascertained.

The fill averaged some 4 to 6 ft. in thickness and it was found that the subsoil consisted of a good sandy gravel suitable to take the required loading.

Gravel Bed Exposed

It was decided to remove all filled ground by excavating a basin averaging 8 to 10 ft. deep exposing the gravel bed upon which a simple reinforced concrete raft foundation was laid. The basin was made of sufficient diameter to provide a walkway round the holder and the sides were sloped at an angle and have been suitably paved with concrete slabs.

Control of the holder is effected from the works nearly two miles away by means of remote indication and control equipment supplied by Automatic Telephone and Electric Co. Ltd. This equipment provides the controlling engineer

with all relevant information concerning conditions at the gas holder, and the means of controlling these conditions as required.

All the facilities of indication and control are effected over one pair of telephone wires by means of electrical apparatus similar to that used in automatic telephone systems with direct current coded impulses. A single pair of telephone wires is the only link between the control cubicle at the gasworks and the apparatus at the holder station. Telephonic communication between the two points is also provided over the same pair of wires.

The apparatus at the holder station operates on 24 V. A.C. and 50 V. D.C. and in the event of power failure batteries which are floating on the system provide the necessary current to continue operation. Batteries are kept fully charged automatically.

View showing basin with walkway and sides paved with concrete slabs resting on simple reinforced concrete raft foundation laid on gravel bed.

The facilities provided include:

(1) Remote indication of the pressure at the outlet of the station governor. This information is conveyed in the following way:—

In a small wall mounted instrument a pivoted metal bar is acted on by the pressure of gas under a diaphragm and this force is opposed by a spring. The metal bar has very limited freedom and any tendency to move from its central position sets in motion a 24 V. 3 phase reversible instrument motor which through a train of gears moves the anchorage of the spring. On one of the intermediate shafts of the mechanism are a set of indented cams, the followers of which operate contacts and cause coded impulses to be transmitted to an interpreting mechanism at the works end where the pressure is indicated.

High Accuracy

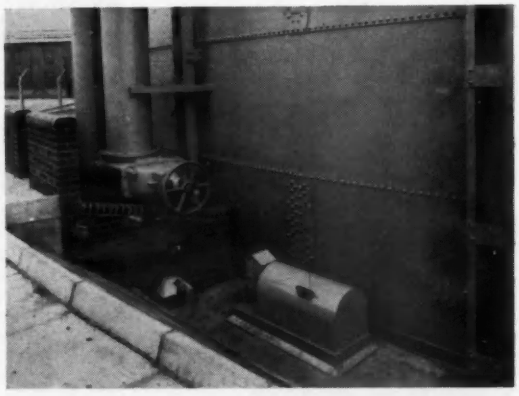
The accuracy of the instrument is within 0.2 in. W.G.

(2) Remote indication of holder height.

A Wayne reeling drum situated on ground level operates directly a shaft with indented cams similar in appearance to those in the pressure transmitter; and contacts on the cam followers cause coded impulses to pass in a similar way as for the pressure indicator. The holder height instrument could of course actuate high and low level alarms but it was considered advisable to have such alarms entirely separate and mercury tipping switches operated by strikers on the holder were installed. As a further precaution against overfilling there is the usual three-way cock which vents pressure on a diaphragm of a governor in the auxiliary system of the Donkin volumetric governor and cuts off the gas. The holder height indicator is accurate to approximately 12 in. or 15,000 cu.ft.

(3) Remote indication of the rate of flow into the holder.

The flow is measured by a Kents ring balance meter which varies a high resistance in the main circuit; a milliammeter at the works graduated in cu.ft. per hour, provides the information. This information is conveyed over the two wires continuously except for the brief instant when one of the other facilities requires an impulse to pass or during the period of a telephone conversation.



Outlet gas main showing outlet valve and anti-flood pipes. In the foreground is the 'Wayne' reeling drum which measures the stock of gas in the holder.

(4) Remote control of flow into the holder.

Operation of the volumetric governor from the controlling end is effected by means of a selector and press buttons to increase or decrease. A single impulse from the pressing of a button causes a pre-determined movement of the motor which rotates a cam, the follower of which by compressing a spring, loads a governor in the auxiliary system of the volumetric governor. Alterations are made in steps of 12,000 cu.ft. per hour between limits of zero and 120,000 cu.ft. per hour.

(5) Remote control of the setting of the station governor.

This is carried out by suitable selection and then in the same way as for the volumetric governor. The cam on the operating motor in this case acts directly on to the pilot governor of the Donkin district pressure regulator.

Warning Devices

Various indications and alarms are provided which inform the controlling engineer of such things as mains electricity supply or fuse failure at the holder station and whether the anti-freeze equipment is in the off, half on or full on position.

The holder has been equipped with the 'Crowther Dryden' automatic electrical anti-freeze system of heating. This system is fully automatic and requires no manual attention. It is arranged to apply heat to each seal in two stages, half the heat in the first period of freezing and full heat later if really deep freezing occurs.

An air controlled temperature regulator is provided for this purpose and can be set to operate at any predetermined temperature. The equipment fitted is rated at 118 kW. based on giving a heat output equivalent to 60 W. per ft. run of heater element.

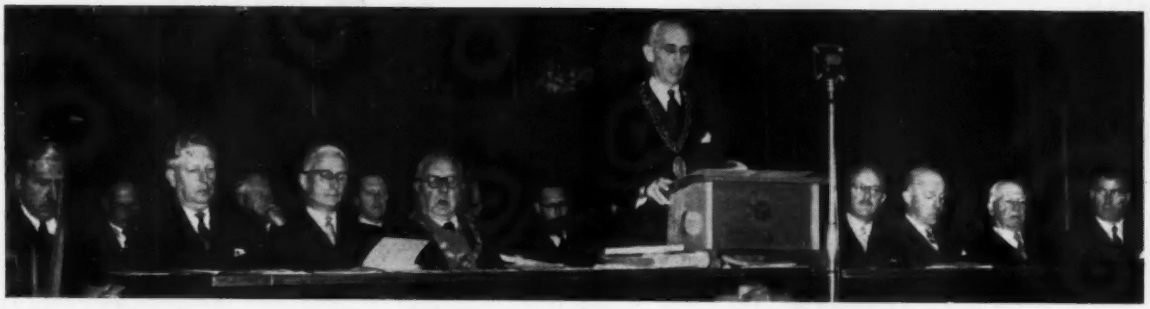
The control gear is connected to a 440 V. 3-phase supply provided by the Electricity Board which is transformed down to 295 V. by an autotransformer in the switch house and then fed to the holder about 30 yards away through armoured cable and distributed to the various water seals by means of distribution fuse boxes, flexible cables and special joint boxes, connecting the heater elements. The heater elements are formed of M.I.C.C. cable immersed in water around the periphery of the dips and the tank.

The equipment of the holder is of flameproof design (not yet certified) suitable for Group 3 gases. The control equipment is not flameproof being situated in the building with the other control gear where such precautions are unnecessary.

Scottish Association of Gas Managers

'WE MUST NOT BE COMPLACENT'

Sir Harold Smith Sounds Warning Note at Annual Meeting



The President, Mr. W. M. Gledhill, opens the meeting.

LIKE most things connected with the gas industry in Scotland, the Scottish Association of Gas Managers has undergone a streamlining. To make way in the annual calendar of events for the innovation of a Scottish Gas Board staff conference, the Association's spring conference has been dropped. The annual meeting, an autumn event, has been cut to two days—one day for work and one for social activities in the form of golf and bowls.

The annual meeting, the 96th of the series, was held in St. Andrews, on last Thursday and Friday. It may have been symbolic of the times that work came first and pleasure later.

In the Chair

Mr. W. M. Gledhill, Stirling, the President, was in the Chair when the procedings opened in the Younger Graduation Hall. He was accompanied on the platform by Sir Harold Smith, Chairman of the Gas Council; Sir Henry Jones, Deputy Chairman of the Gas Council; Mr. Sydney Smith, Chairman of the Scottish Gas Board; Dr. J. Burns, President of the Institution of Gas Engineers; Mr. M. Flett, Deputy Secretary to the Minister of Power; Mr. J. L. Warrender, Senior Scottish Officer, Ministry of Power; Mr. J. S. Smith, Assistant Secretary, Gas Division, Ministry of Power; Mr. J. E. White, Deputy Chairman, Northern Gas Board; and Mr. W. Sutcliffe, Tyneside Divisional General Manager.

Following a civil welcome from Provost D. Fraser, St. Andrews,—('I have no fear of the gas industry as long as the housewives of this country are given a free choice; I leave it to them with every confidence')—Sir Harold Smith addressed the meeting.

Referring to the Provost's comment, Sir Harold said: 'We must not be too complacent about this and form ourselves into a mutual admiration society. We have got to realise that we are really up against it to-day.

'While the gas industry obviously can go on for many years just existing, we don't want to do that. We want to go on developing as we have been developing for nearly 200 years.

'We are not doing too badly. We might have done very much worse; but we might have done very much better if perhaps we had tried a little harder and perhaps also if we had not had to put up with what we consider to be unfair treatment arising from the incidence of purchase tax and hire-purchase restrictions. Nevertheless, as an industry, our record since we were nationalised is not too bad a one.'

Sir Harold pointed out that they were having to meet increased costs, over which they had no control, to the tune of £135 mill. in a year and they were only recovering by way of increased revenue from gas and coke something like £120 mill. so that they had to absorb £15 mill. of extra costs by their own efforts. As a contribution towards that, they were using something like 2 mill. tons of coal less in a year.

Not Appreciated

All these things were not fully appreciated outside and 'If we don't tell the world what we have done in the gas industry no one else will tell it for us. It is rather disappointing to find that generally readers of the daily Press are not interested in anything that sounds like a success story; all they want to read about is failure. The price of gas may have gone up on an average by something like 11d. or 1s. a therm because of these increased costs, but had we been able to carry on with the same costs as we had in 1948 the price of gas on an average could have been reduced by 1½d. per therm compared with the pre-nationalisation figure.'

What of the future? Quite obviously, the next 15 or 20 years, possibly less, were going to see great developments in the gas industry. 'You in Scotland are constructing a grid. Most of the other areas are also constructing area grids. The result to date has meant the closing down of something like 400 gasworks out of 1,000.

'The time is coming, I am perfectly sure, when there is going to be a national grid into which will be fed not only the gas made in orthodox carbonising plants but also gas made by catalytic oil plants and other processes, which we hope will lead to the complete gasification of the small coal which is now in surplus and which nobody can use. We are going to try to do our best to use a lot of this small coal.

Liquid Methane

'The latest thing is that very serious consideration is being given to liquid natural gas, of which there are ample supplies going to waste in Venezuela and the Middle East. I hope it won't be very long before the first experimental ship crosses the Atlantic carrying natural gas in liquid form.

'If this proves successful it should be followed by the importation on a large scale of natural gas, by which time the price at which that gas can be imported into this country should be considerably lower than the price at which we can manufacture gas ourselves.

'It is all very well for us to do this,' concluded Sir Harold, 'but that is by no means the end of the story. The success of the gas industry will depend on you gas managers and on gas managers in other parts of the country. It doesn't matter how efficient the plant is, if the man who actually deals with the consumer isn't doing his stuff properly, then we are doomed to failure. Let us see that everything connected with the gas industry is operating in the way that we know it should be operating.'

Mr. Sydney Smith, referring to the dis-

continuance of the spring meeting of the Association because of the introduction of a staff conference, said: 'I am aware that there are mixed feelings on the matter, possibly because tradition dies hard; but all of us must agree that the requirements of changing conditions must be met as far as possible. That is why the Board decided that, in the interests of the majority of staff, and after discussion with members of your Council, a change should be made.'

He added: 'I am also aware that before the first staff conference took place last May, it was looked upon with aloofness and suspicion and, possibly, with some criticism; but I am told that widespread opinion has since confirmed that it was well worthwhile, and thoroughly enjoyed by the vast majority of those present. It certainly left something to be desired in one or two directions, but these will be corrected for our second conference, to be held at Largs in May, 1958.'

Because of the widespread nature of the Scottish Area and of the need to maintain gas supplies and consumer-service, attendance at the staff conferences would be by rota. Over the period of two or three years all staff considered eligible to attend would be invited to do so.

Major Changes

Mr. Smith said that during the past 12 months, major changes had occurred in many directions. The Board's administrative structure had been completely reorganised and this had caused upheavals in many places. The new organisation was rapidly settling down, and the Board was most appreciative of the patience, understanding, and co-operation of everyone concerned in what undoubtedly had been a major operation.

A good start had been made with the Board's proposals for meeting competition and for improving consumer-service. The general-purpose tariff covering the whole of Scotland, and the optional domestic two-part tariff should provide one of the finest weapons which any sales organisation could wish to have.

So far as the future was concerned, arrangements had been made to purchase substantial quantities of coke-oven gas and smaller quantities of methane, and they were making rapid progress with their plans for integration on a wide scale.

'The future is bright, make no mistake on that,' concluded Mr. Smith. 'Towards the end of last year, I said that we were trailing behind every other gas board in the country. That statement was perfectly true. But conditions have changed; we are making progress; and I hope that the time is not too far distant when Scotland will be back where she should be—in the van of progress with the Scottish team setting the pace.'

Mr. M. Flett said that the fuel picture was now becoming rather clearer, and they had a fairly accurate forecast of what the problem facing the industry as a whole would be over the next two decades. The country was at the moment using 250 mill. tons of coal equivalent per annum. By 1965 it was estimated that they would need 310 mill. tons—a very formidable programme. They were importing fuel at a net cost to the country of something like £250 mill. per annum. If they were going to increase the rate of consumption that figure was going to rise to £400 mill. or £500 mill. within the foreseeable future. Another problem was what they were going to do with their resources of small coal, which were becoming increasingly available. The nuclear power programme would play its part in all this, but of the extra 60 mill. tons of coal equivalent that had been mentioned they could only hope for about 14 mill. tons from nuclear power. They had, he concluded, to develop every available form of energy they could and make the very best use they could of their resources. In this objective the gas industry had a most exciting future before it.

In his Presidential address, Mr. Gledhill said that the Association's Council and Emergency Committee had been 'confronted' with the proposals of the Scottish Gas Board; and after discussions they had agreed to respect the Board's wishes.

'Since the principal object of this decision will limit the Association to the holding of an annual meeting, your Council have under consideration the introduction of district meetings in geographically suitable centres. It is recognised that only small numbers of members may be present in the less populated districts, but it is suggested that collaboration with local technical bodies could provide those members with the facilities and opportunity of meeting as desired.'

Mr. Gledhill went on to refer to the introduction of functional systems of management within the Scottish Gas

The Social Activities

On Eden Golf Course

THE Autumn Meeting of the Scottish Association of Gas Managers Golf Circle, was played over the Eden course, St. Andrews, on September 20.

The challenge bowl and replica was won by R. Stewart, 74 – 2 = 72.

In Section I, the winner was R. H. Bell, 81 – 8 = 73; while T. H. Johnson, 77 – 2, C. H. Chapman, 81 – 6, and D. Harrison, 85 – 10, tied with 75.

In Section II, the first prize went to W. Kirk, 91 – 14 = 77; and the second prize to H. S. Milne, 95 – 16 = 79. E. Aspinall, 94—14, and D. Wilson, 96—16, tied with 80, followed by J. E. Clark, 100 – 19 = 81, and L. B. Steel, 99 – 17 = 82.

Veterans' Trophy

The Winson Scott cup and veterans' trophy was won by J. T. Taylor, 87 – 10 = 77.

The annual general meeting was held in the evening in the elegant premises of the St. Andrews New Golf Club, with the Captain, Mr. James Dow, in the Chair. He referred first to the sad death of that very keen golfer Mr. Willie Campbell, a past Captain, and the members stood in respect. Mr. Dow then said how very pleased the members were that Sir Harold Smith and Sir Henry Jones had found time to be present at the meeting; they were indeed welcome.

Mrs. Dow then presented the prizes, was thanked by the Vice-Captain, and was asked to accept a memento of the occasion. Her reply was received with acclamation.

Mr. Clifford King was elected Captain for 1957-58; Mr. E. G. Smith, Vice-Captain; and Mr. D. D. Burns the new Member of Committee. The new Captain, having been presented with the badge of office, proposed a hearty vote of thanks to Mr. Dow, who during the past year must have met many problems and made many decisions—undoubtedly with his customary ability and tact.

The cup then circulated.

Winner among the visitors was W. T. Wright, 81 – 7 = 74; followed by Ian Reid and W. Sutcliffe, 95 – 18 = 77.

The Ladies' Golf Circle winners were—first prize and Handley salver, Mrs. E. Wilson; second prize, Mrs. S. Hall; third prize, Mrs. T. Greive; scratch prize, Mrs. L. Fletcher.

At the ladies' general meeting Mrs. D. D. Burns was elected to succeed Mrs. Clifford King as Captain. A hearty vote of thanks was voted to Mrs. Fletcher for her hard and rewarding work as Hon. Secretary of the Circle.

ON THE BOWLING CLUB GREEN

A LARGE number of members and visitors attended at the St. Andrews Bowling Club green for the annual competition on September 20.

The bowling trophy was won by J. S. Ednie, Crieff, L. Bain, Greenock, R. S. Murray, Glasgow, and R. Macfie, Rothesay, who were 12 shots up.

Second prizes were won by H. Fishburne, Retford, G. Sheill, Innerleithen, J. Hall, Glasgow, and G. Hannah, New Cumnock, who were 10 shots up.

Prizes were presented by Mrs. W. M. Gledhill, wife of the President of the Scottish Association of Gas Managers. At the annual general meeting held in the clubhouse afterwards, Mr. W. T. Gilchrist, Cowdenbeath, was elected President of the Club for 1957/58.

Board, and added: 'The ordinary membership of our Association, which so far has been composed principally of managers of gas undertakings, will tend to be progressively reduced as functional officers are appointed and as integration extends within Scotland to eliminate uneconomic gas works.

'In order that ordinary membership may be sustained in the light of the new organisation, your Council have given much thought to Rule No. 4 of the Constitution which states: "The Ordinary Members shall be (a) managers of gasworks or (b) qualified gas engineers, who, in the opinion of the Council, hold responsible positions." It was decided that these definitions were sufficient to enable the Council to determine the eligibility of applicants for ordinary membership, which would include the majority of persons appointed to responsible functional positions.'

Price Increases

Continuing, Mr. Gledhill said that the adverse effect of price increases upon the domestic consumption of gas was one of their major problems. The introduction in Scotland of a block tariff for all types of consumer, and an optional two-part tariff for domestic consumers, had now provided a most important sales weapon not only for the defence of existing business but also for its competitive application in all fields of utilisation.

A vote of thanks was accorded to the President on the motion of Mr. G. Hannah, New Cumnock, seconded by Mr. A. McFadyen, Glasgow.

Mr. Ernest West, Manchester, gave the William Young Memorial Lecture—'Fuel Problems of To-day and To-morrow,' remarking that he was privileged in his early youth to know William Young personally when in his later years he lived at Priorsford.

The inland consumption of coal, reported by the National Coal Board for the year ended December, 1956, was 218.2 mill. tons, said Mr. West. Of this total some 57.2 mill. tons were processed by the gas and coking industries representing only 25%, and here it should be emphasised that this latter quantity was processed at a high rate of thermal efficiency, whereas the remainder was largely used in combustion, in many cases at a very low rate of efficiency representing considerable waste, as well as seriously polluting the atmosphere especially in large cities.

The gas and coking industries process coal at a thermal efficiency of from 75 to 80%, delivering to the consumer gaseous and solid smokeless fuels and in addition a vast variety of valuable by-products; the number of tar derivatives obtained by the chemical industries is well over 2,000, in addition to the sulphate of ammonia and other derivatives from the liquor.

Gaseous fuel lends itself to a greater extent than any other heating medium to close and automatic control both of temperature and of atmosphere in a vast number of industrial processes (of which the heat treatment of steel and other metals is an example). It provides the only complete solution of the problem of the elimination of domestic smoke and grit which contributes a very high proportion of the damage due to air pollution.

The National Smoke Abatement Society estimate that in this country we produce 2.4 mill. tons of smoke every year, and of this total, industry is responsible for 700,000 tons, and the railways for 400,000 tons; but 1.3 mill. tons come from domestic fireplaces. A recent estimate is that the cost of the damage inflicted by domestic smoke is of the order of £6 per ton of raw coal burned in the domestic grate.

In Short Supply

Good caking quality coal is in short supply and we shall have to make more use of the lesser coking coals in the future; considerable investigation and practical tests are being carried out in order to meet the situation. At the same time a by no means negligible amount of coking and gas making coals are supplied to domestic and industrial consumers. Such a use of these coals is not only in itself unjustifiable but in many cases causes difficulties to the users. It may be that this undesirable state of affairs arises from considerations of transport but the urgency of conserving our resources and ensuring efficient usage of these coals should over-ride any other factors.

The oxygen content in the coal affects materially the rate at which distillation can be carried out and it is well known in Scotland, where coals up to 10% of oxygen inherent in the coal exist, that the rate is much higher than in the North of England Durham seams which only contain about 3%.

No doubt the hydrogenation of coal to produce oil is a proved technical possibility but it may be doubted whether it will ever be justified by commercial results. Its apparent success in Germany with lignites was possibly only justified by the desperate requirements of war for liquid fuel regardless of cost.

Gasification of black coal under pressure by the Lurgi process has, however, been demonstrated on pilot plant by Dr. Dent at the Birmingham Research Station. Again the initial success was with lignites but it has been shown that the weakly caking British coals of the ranks 702 to 902, 'the full series of high volatile coals up to the carbonisable range,' can be successfully treated. Gasification is effected by steam and oxygen at pressures in the region of 300 lb. per sq. in. at which pressure 'methane is stable at the temperatures in the upper part of the fuel bed.' It appears practicable to produce gas at 450 B.Th.U. per cu.ft. in this process and the erection of a full-scale plant is contemplated by certain area boards.

In this connection the paper on the Lurgi installation at Morwell in Australia, recently presented to the Institution of Gas Engineers by Dr. R. S. Andrews, is extremely interesting. While this project was based on special circumstances, namely the existence of very large deposits of easily won brown coal, the general inferences are worth noting. Briefly, it would appear from the evidence to date that for economic town gas production by this system a low price coal and high capacity units of not less than 25 to 30 mill. cu.ft. per day are essential.

Fascinating Prospect

There is the possibility of a system of this type in conjunction with other processes being employed not only for gas manufacture but for the production of liquid fuels and various chemical products. The prospect of a further extension of the field of the gas industry on these lines, while fascinating, is obviously a subject which could not be pursued within the limits of this lecture and, as already stated, economics to-day would make this a vision of the future rather than a possibility of the present.

While all these processes are being developed there is no indication that a cheaper commodity is available. We are all aware of the vast amount of investigation and research that is already being carried out by the gas industry in order to obtain higher efficiencies in the processing of coal but if the industry is to maintain its position and expand its sales every effort should be exerted towards the production of cheaper gas.

There is, however, every reason to study again the well-known and established processes of carbonisation to ascertain if more economical methods can be applied to it.

The President, Mr. W. M. Gledhill, with the Council Members.

Mr. Sydney Smith; Sir Harold Smith; Mr. W. M. Gledhill, and Sir Henry Jones.

One such method is the application of a carrier gas to the continuous vertical retort system in order to utilise the internal heat of the coke in the lower ends of the retort in assisting internal distillation, and you have had several papers laid before you upon this subject. It must be noted, however, that while the speed of throughput of coal has been materially increased the carrier gas had to be manufactured in separate plant and special precautions taken in introducing the gas to the retorts.

A further development in the carrier gas process is being experimented with, in the introduction of hot gas into the continuous vertical retort, to ascertain whether it is possible to effect distillation of the coal to a still greater extent by internal heating, dispensing with present methods of external heating. It is known that if 'contact heating' can be applied to the coal, comparatively low temperatures (around 600°C.) are sufficient to effect complete carbonisation. Recent tests have given results which are so encouraging that further experimental work in this direction is being undertaken. It is possible that this may lead to the production of gas and solid smokeless fuel at a significantly reduced cost.

Immediate Economies

Complete gasification of coal has also been receiving considerable attention and it is probably in this direction that development can proceed to show considerable and immediate economies. Its success will probably be bound up with the problem of the distribution of low c.v. gas, and in this connection it should be noted that in Scotland many undertakings have successfully distributed gas of a lower calorific value than is usual in England.

On the basis that 'one therm is as good as another' and that low c.v. gas gives a higher efficiency at the burner, it is worthwhile investigating processes which, using air and operating at atmospheric pressures, produce gas at calorific values somewhat lower than the carbonising process.

As long ago as 1919, William Cranfield, in his William Young Memorial Lecture of that year, called attention to the significance of the discovery, probably first announced by Mr. George Helps but afterwards fully confirmed by the work of the Joint Gas Investigation Committee, that heating values in the application of all combustible gases were in direct proportion to their B.Th.U. content. 'This discovery,' said that 1919 William Young lecturer, 'as to the parity of the B.Th.U. is a landmark in the history not only of low-grade gas but of fuel generally, and, in my opinion, its value to the country is incalculable.' And so, indeed, it has proved to be.

A simple calculation of the revenue received from the sale of gas and coke to-day and that of all-gas from complete gasification, on the basis of gas at 16.5d. per therm and coke at 110s. per ton, indicates the following results from the processing of one ton of coal:

Gas and coke		Complete gasification	
Gas, 80 therms,	110s.	Gas, 160 therms,	220s.
Coke, 10 cwt.	55s.		
	165s.		220s.

showing an increased revenue of 55s. per ton of coal.

Vast Undertaking

This will be regarded as over-simplification, but it is evident that the increased income of all-gas sales indicates a considerable margin available to cover distribution charges and to reduce the price to the consumer. The handling, screening, and carting of coke represents a vast undertaking in all areas, whereas if the coke were gasified and distributed on tap where required considerable economies in distribution of potential heat would be achieved.

Owing to the lower capital cost of some low pressure complete gasification plants, capital charges would be reduced and the area occupied considerably reduced, especially if a lower c.v. gas of, say, 340 was distributed. For instance, all coke handling plants and stocking of coke could be eliminated. Coke as smokeless fuel is sold at a very low price for thermal value, but it cannot be denied that the labour involved in handling this fuel by the householder or the industrialist is considerable.

One gentleman at a fuel efficiency debate dropped a penny on the floor and in picking it up stated that he had exerted energy at the rate of 1 h.p. and when we consider the handling of coke from store and filling up the fire or stove several times a day, together with the stoking and the disposal of the dirty ashes, the effort exerted is quite considerable, whereas that exerted in the turning of a simple gas tap is infinitesimal, apart from the saving of time.

There would, therefore, appear to be some considerable grounds for further investigation into complete gasification, even though this should be a long term development tied up with the distribution, the difficulties of which would appear to be not insurmountable.

An interesting development in the long distance transmission of gas is the use of very much higher pressures than have been usual in the past. The result is that the mains themselves become a valuable system of underground storage. The North Thames Gas Board, for instance, has adopted, for a main four miles long from Wooburn to High Wycombe, a working pressure of 260 lb. per sq. in. giving a storage capacity of 720,000 cu.ft. of gas at NTP. In Australia the main from Melbourne to Morwell, a distance of about 90 miles, with a working pressure of 400 lb. per sq. in., will store 11,000 mill. cu.ft. of gas. Even higher pressures are in use on the Continent. Pipe lines in Holland and Belgium are being operated at 585 lb. per sq. in. while the mains transmitting gas from the coke ovens in the Saar to Paris are operated with an initial pressure of 875 lb. per sq. in.

Underground Storage

Underground gas storage is very attractive from many points of view, but the use of long transmission mains for this purpose has the advantage over that of geological formations in that the mains are gas-tight and all the gas can be recovered.

Referring again to the advantages that are gained to the country by processing coal, there is no doubt that a good case can be made out for the electrical industry to adopt a process that could supply gaseous fuel to high pressure boilers with considerable advantage; and possibly in the future direct to gas turbines.

If the electrical industry would co-operate with the gas industry, whereby the units are built together on the same site, such a scheme is feasible. Co-operation, combined with active enterprise in this direction, might in the long run benefit both industries and be of national advantage.

A proposal was prepared in 1933 to install on a generating station a combination of the two well-known systems of gas manufacture, the continuous vertical retort and water-gas generators, gasifying the whole of the coal and coke, with gasholders to meet peak load requirements and with complete by-products recovery. Such a combination would liberate a considerable quantity of valuable by-products and at the same time eliminate atmospheric pollution from the power station, especially that due to sulphur.

Estimates at that time, including all charges, showed that gas of 370 B.Th.U. per cu.ft. could be delivered to boilers or gas turbines at around 1d. per therm. It is reasonable to suppose that, taking into account increased costs at the present time and applying modern methods of complete gasification, the cost would be in the region of 4½d. per therm delivered to the electricity generating plant.

The shortage of solid fuel supplies have necessitated the use of oil to fill the gap and the gas industry has installed

several types of plant for the gasification of oil to meet the situation. For industrial purposes, however, it would appear to be cheaper and more efficient to burn oil direct, under boilers, etc., rather than to gasify it.

Mr. Maudling, spokesman of the Ministry of Power in the House of Commons, announced in May last that by 1965 nuclear power stations would be producing energy with a coal equivalent of 18 mill. tons a year. He admitted that the development of these stations would be a very heavy burden on the capital resources of the country. The total cost of the stations in the programme would be £919 mill. But it must be remembered that further *large sums* are to be spent on conventional plant. The Minister himself has stated that the Electricity Authority contemplates spending in the near future the stupendous total of £3,350 mill. on nuclear stations, coal-fired power stations, and on extensions and developments of the distribution systems.

Benefits Far Off

However, it is evident that it will be many years before a substantial addition to our power supplies can be achieved, so that in the meantime there is every reason to adopt whatever methods can be devised to produce higher efficiencies in the use of our coal resources.

It has been estimated that in the period from 1955 to 1965 the country's energy requirements will increase by some 50 mill. tons of coal equivalent. In this expansion there will be considerable fields for the use of industrial gas with the vastly improved up-to-date fuel burning equipment which is now available. The same applies to cooking, space heating, and water heating. Our technicians have taken a leading part in providing equipment to give increased efficiency and the last few years have seen substantial improvement in many types of gas-using appliances.

In view of this the gas industry must ensure, for its own sake, that out-of-date appliances are replaced as far as possible.

To revert to the subject of clean air, even before the Act became law, smokeless zones were being steadily adopted in several of our cities, of which Manchester was one of the first, and it is already apparent that these measures are proving effective in cleaning up the atmosphere to the benefit of the health of the citizens. Gas must play an increasing part in this campaign.

The Clean Air Act has created a new incentive for the gas industry, in particular, to show the way to the utilisation of our indigenous coal resources with still greater efficiency. Every encouragement should be given to research and practical investigation to extract every possible benefit from our great national asset.

One must say something about automation. The word, so frequently used to-day, as though it represented a new development in industry, is really the application of mechanical and scientific control to any process. It has been steadily applied to the process of gas manufacture for over a century, illustrated by the example of the early hand firing of gas retorts compared with the modern up-to-date installations of to-day with their greatly increased efficiency. This work is continuing and attention is being constantly directed to modern developments on all aspects of this technique, including electronics, with a view to their possible application in our industry.

Mr. D. Harrison (Woodall-Duckham); Mr. W. T. Wright (J. G. Stein); Mr. G. Keillor; Mr. N. V. Cross (Woodall-Duckham); Mr. H. Fishburne; and Mr. John Ford (Inverness).

Following the Young Memorial Lecture, a paper entitled 'Water Cooling System, Granton Gasworks' was given by Mr. G. J. B. Cox, Deputy General Manager, Edinburgh Division.

As a result of difficulties experienced at Granton and in order to comply with requests by the City Water Engineer to reduce consumption, investigations were begun in 1949 into the most efficient and economical methods of water conservation, and in the absence of adequate supplies an efficient method of cooling became the only solution, Mr. Cox explained.

Various Methods

There are various methods for reducing the temperature of water used for industrial purposes in a gasworks—circulation through gasholder tanks; cooling ponds with or without sprays; natural draught cooling towers; forced draught cooling towers; and induced draught cooling towers. After due consideration of these possibilities, tenders for both forced and induced draught towers were invited from three firms, as a result of which an induced draught 3-cell unit in timber with spray distribution was selected.

This system relies on the physical admixture of air and water, the water being supplied through high-pressure self-clearing nozzles giving equal water loading. The physical carry-over is negligible, spray eliminators being installed below the fan. Equal distribution of water is positive and will need less inspection and maintenance.

The plant consists of 'Counterflo' induced draught cooling towers mounted above a reinforced concrete basin with a hot water surge tank and cooled water suction pits. Adjacent to the cooling towers and basin is an open top reinforced concrete pump pit containing three duplicate sets of centrifugal pumps situated below ground level in order to give a flooded suction to the pumps. At one end of the pump pit is situated the switchgear house containing the starters for the pumps and fans, and also the flow meters indicating the rate of circulation for each of the pumps. The water distribution system to the overhead tanks and return lines to the hot water surge tanks from the condensers consists of cast iron underground pipes, mainly of the screwed and bolted gland type varying in diameter from 6in. to 18 in.

The cooling towers are capable of cooling 200,000 gal. of water per hour at an initial temperature of 120°F., to a final temperature of 65°F., when the wet bulb temperature is 55°F., and are constructed in three cells 30 ft. long by 42 ft. wide arranged side by side and having an overall height above the basin curb line of 40 ft. The material of construction is Woolman 'Tanalith' treated European redwood and all the bolts, etc., are galvanised. At 2 ft. intervals throughout the height of the towers are layers of sloping bar grid decking and on top of the decking is situated the high pressure upsprays water distributing system.

Between the distribution system and the fan deck is situated a two-pass zig-zag drift eliminator, cutting drift loss down to 0.2%. The outer shell of the tower is of double wall construction, designed to give constant circulation of air between the walls and prevent leakage of water through the walls. On top of each cell is an axial flow propellor type fan 18 ft. diameter with variable pitch blades and capable of running at 120 or 60 r.p.m., the fan being driven through a reduction gear by a 30 h.p. electric motor.

Pumps Duplicated

Hot water from the surge tank is delivered through a header pipe to any or all of the three 10 in. diameter riser pipes to the tower distribution system by means of a 200,000 gal. per hour pump driven by a 120 h.p. electric motor. A make-up pipe from the cooled water basin is connected to the suction line of this pump and controlled by a hydraulic valve operated by a float in the surge tank. All the pumps have a duplicate standby and if required can be used for parallel running.

There are four cast iron overhead tanks, three of capacity 30,000 gal. and one of capacity 15,000 gal. situated 38 ft. above ground level, supplying water to the coal gas condensers, two above each condenser house, and these are at present fed continuously with recirculated water through ball controlled valves from a 160,000 gal. per hour capa-

city centrifugal pump driven by a 125 H.P. electric motor.

The carburetted water gas condensers are fed with water from two reinforced concrete tanks, capacity 40,000 gal. each, situated on top of the No. 4 coke screening plant, 78 ft. above ground level. The tanks are fed intermittently with re-circulated water only from a 40,000-gal.-per-hour capacity centrifugal pump driven by a 57½ H.P. electric motor, the operation of which is controlled by a high/low level float switch situated in one of the tanks. All the overhead tanks have a low level audible alarm.

Only the condenser water is returned to the cooling system, although the overhead tanks at the coal gas condensers feed other items of plant (ash quenching, etc.) and consequently a large amount of make-up to the system is required. This make-up is supplied at the cooling tower basin and at the coal gas condensers overhead tanks.

Safeguards

In the event of electrical supply failure, the system can be changed over to the works quarry using the existing steam turbine-driven pumps.

In the event of a town's water supply failure, make-up water can be supplied from the works quarry or from Craigleith quarry.

The tower was put to work in May, 1956, and with the exception of two unsatisfactory features to which reference is made below, has been reasonably efficient as is indicated by the results of a recent test which is shown in Table 1.

TABLE 1.

Rate of circulation through towers	115,000 g.h.p.
Temperature of water returned to surge tank	94°F.
Cooled water temperature at suction pits	63.5°F.
Cooling range	30.5°F.
Wet bulb temperature	58°F.
Approach to wet bulb temperature	5.5°F.
Outlet gas temperatures at condensers	63.5°F.
Performance co-efficient	1733

Although the first winter, during which the cooling system was in operation, was mild, it was possible during a few of the colder spells to run the towers with all the fans off and the water load spread equally over all the cells. The undernoted gives the setting of the towers for varying wet bulb temperatures issued as operation instructions and based on tests carried out on the system.

(a) Hottest condition (wet bulb temperature 48°F. and above). Two fans full speed, one fan off with a trickle of water passing over its cell (to make use of the natural draught), and the remainder of the water load spread equally over the other two cells.

(b) Reduced temperature (wet bulb temperature 45°F.-48°F.). One fan full speed with two-thirds of load on its cell, two fans half speed with one-third of load spread equally over the two cells.

(c) Reduced temperature (wet bulb temperature 43°F.-45°F.). One fan full speed with three-quarters of load on its cell, one fan half speed with one-quarter (approximately) of load on its cell, one fan off with a trickle of water passing over.

(d) Reduced temperature (wet bulb temperature 40°F.-43°F.). One fan full speed with seven-eighths of load on its cell, remainder spread over the other two cells.

(e) Reduced temperature (wet bulb temperature 38°F.-40°F.). Three fans half speed with load spread equally over three cells.

(f) Reduced temperature (wet bulb temperature 36°F.-38°F.). Two fans half speed. One fan off with reasonable flow and remainder spread equally over the other two cells.

(g) Reduced temperature (wet bulb temperature 34°F.-36°F.). One fan half speed with two-thirds of load on its cell, two fans off with one-third of load spread equally over the two cells.

(h) Lowest temperature (wet bulb temperature 34°F. and below). All fans off with load spread equally over three cells.

Capacity of Towers

The towers are capable of cooling 200,000 gal. per hour but normal circulation for the pumps delivering to the overhead tanks is between 60,000 and 75,000 gal. per hour which is approximately one-third of the total load, and to bring the pumps nearer their operating capacity and also attain a nearer approach to the wet bulb temperature, it was decided to circulate water through the towers at a rate of at least 100,000 gal. per hour and use two fans. The power consumption of the pumps did not increase to any marked degree with this throughput.

Regular tests of the water to and from the towers are taken for hardness, alkalinity, chloride and pH value, and are shown in Table II below:—

From these figures the number of concentrations of town water make-up in the system as a result of evaporation may be obtained from:—

$$n = \frac{\text{Chlorides in circulating water}}{\text{Chlorides in town make-up water}}$$

$$= \frac{10}{10} = 1 \qquad 24.5.56$$

$$\frac{10}{11} = 0.9 \qquad 22.7.57$$

n has never been over 1.6 and these low figures show two conditions:—

(a) That the amount of loss due to evaporation is not high

and

(b) that there is a considerable loss for other reasons resulting in a high volume of make-up.

Some algae is gathering on the surface of the water in the pond and there are traces of moss at the top of the towers. This will be treated by chlorination with sodium hypochlorite.

Edinburgh town make-up is corrosive water and it might be expected that some corrosion might result when this water is used for cooling purposes in pipes. Mild steel test pieces have been inserted in the water passages and these are due for inspection. Should corrosion be found, this may be controlled by raising the pH value of the circulating water by use of lime, caustic soda or soda ash, or by sodium hexametaphosphate.

As already mentioned, there have been two unsatisfactory features about the first year's operation of the plant. These are:—

1. Electricity consumption. For the first year in operation, the number of units consumed by the plant amounted to 1,437,760. To effect a saving in electricity, the pumps delivering to the overhead tanks at the coal gas condenser will be made to run intermittently and will be controlled by a system of high/low level cut-out switches in the tanks, the pumps cutting out when all the tanks are at their high level and cutting in when the water in any one tank reaches its low level position. The ball-controlled valves will remain to prevent overfilling since the tanks are at different levels. This improvement is expected to save £1,700 per annum.

Pump Damaged

2. Cavitation of pump casing. The pumps delivering hot water from the surge tanks to the towers are designed to deliver 200,000 gal. per hour at a temperature of 120°F., and a pump differential pressure of 35 lb. per sq. in. They are of the centrifugal type and are driven by 120 h.p. motors. Under running conditions, one pump is operating with the other as standby and it delivers 100,000-120,000 gal. per hour to the towers. The operating temperature of the water varies between 90°F. and 110°F.

After operating for five months a small hole developed in the pump casing. The pumps were changed over and the faulty pump dismantled. On examination it was found that wastage of the cast iron was taking place on the pump casing and cover in the vicinity of the impeller inlet. A hole developed in the second pump in the same relative position after running for a shorter period than the first .

Samples of the cast iron were examined by Dr. R. C. Howie, a metallurgist at the Heriot-Watt College, Edinburgh, and his report suggests that the metal had been subjected to mechanical attack consistent with cavitation and that there was no fault in the material of the cast iron. The pump makers initially blamed cavitation due to water starvation at the pump suction inlet but tests proved that there was 2 lb. per sq. in. pressure at this point, disproving this theory. The makers then suggested that the fault lay in air entrainment at the surge tank suction inlet pipe due to the close proximity

TABLE II.

	Hot return		Cooled water		Town make-up	
	24.5.56	22.7.57	24.5.56	22.7.57	24.5.56	22.7.57
Total hardness T.H.	30	38	29	38	30	44
Calcium hardness CaH. ...	21	28	21	28	21	32
Magnesium hardness MaH. ...	9	10	8	10	9	12
Total alkalinity M.	19	32	18	30	17	39
Chloride Cl.	10	10	10	10	10	11
pH	7.0	7.2	7.0	7.2	7.0	6.8

all in parts per mill. as $Ca\,CO_3$ except pH.

of the cascading return water. An 18 in. pipe was fitted to the return pipe leading the water to a point in the surge tank remote from the suction inlet pipe so that any trapped air in the water was released before it reached the suction pipe.

The first pump casing and cover was built up with weld metal and put into operation and when the second pump was examined it was found to be in the same condition as the first, and it too was welded. On further examination of the first pump it was apparent that the attack on the cast iron was continuing; attack on the weld metal was also taking place although not so rapidly as on the cast iron. The additional area of cast iron was welded and a surface weld of stainless steel deposited on the whole welded surface.

This was repeated for the second pump. It has not been possible as yet to dismantle the first pump put into operation after receiving the stainless steel surface weld, but indications are that the attack is still taking place. Although pressed, the makers have not yet offered a solution to this problem. Apart from the above, no other trouble has been experienced with the operation of this system.

The performance co-efficient of 1733 at 94°F. and the results of the tests on the plant indicate that the installation is efficient as a cooling unit, and its effect on the condensation efficiency is shown by the fact that the average gas temperature at the outlet of the condensers for the first year during which the plant was in operation was 59°F. against 76°F. in 1950.

Not so Satisfactory

The overall position is not so satisfactory. In the first year's working, the consumption of town's water was 243 mill. gal. against the estimate of 250 mill. gal. This would appear to be reasonable and after due allowance is made for water used for other purposes the amount required for make-up during the year was 27,500 gal. per mill. cu.ft. of gas made. This again seems reasonable, when compared with a figure of up to 60,000 gal. per mill. before the installation of the towers, but it should be possible to effect some reduction as a result of the experience gained during the first year's working.

It has already been decided that there would be a considerable reduction in the amount of make-up water required if the water for the bottom ironwork of 'A,' 'B,' 'C,' 'D' and 'E' retort benches could be obtained direct from the works quarry and not from the cooling tower as at present. This development is now under consideration.

Original estimates of the savings effected varied from £3,700 to £5,500 per annum. In the first year of operation the overall saving was £2,000 when compared with the previous year 1955-56 and if compared with the year of maximum usage amounted to £5,250. With an anticipated reduction in electricity consumption, to which reference is made earlier in the paper, and if the proposed alteration is made to the method of cooling the bottom castings of the older retort benches, greater savings may be expected in future years.

For its major topic of discussion, the Association turned back to the paper on 'Integration Study' presented by Mr. T. S. Ricketts, Chief Engineer of the Scottish Gas Board, at the Staff Conference in Perth in May, and published in the June 12 issue of the 'GAS JOURNAL.'

Summarising, Mr. Ricketts recalled that nearly 90% of the total gas sold in the Board's area was consumed in the central industrial belt, covering an area of 4,000 sq. miles. Large-scale integration was possible in this area and it was proposed to reduce the number of gasworks in the industrial belt from 75 to 19. Two major grids would be established—the West of Scotland grid, which would serve Glasgow, Renfrewshire, and substantial areas of Lanarkshire and Ayrshire, and the East of Scotland grid, which would serve Fife, Perth, Angus, Kinross, and part of Kincardineshire. The saving in coal resulting from the acceptance of coke-oven gas, methane, and natural gas was estimated to be 750,000 tons per annum by 1960.

Works Closed

At vesting date there were 196 gasworks in operation in Scotland. By April of this year the number had been reduced to 144, and by further integration the number could be reduced to 61 by 1967. Of the works remaining in operation, 36 were small and too remotely situated to be considered for integration. It might be that owing to their size they could never be considered to be economic, but much could be done to improve the efficiency of manufacture. These small works must not be considered to be 'the forgotten few.' Mr. Ricketts went on to explain in detail the integration systems to be constructed.

Opening the discussion, **Mr. C. B. S. Mitchell,** Management Officer, Glasgow and Western Division, said that the closure of more and more works would increase their dependence on a comparatively few large and more efficient producing units. Parallel with these plans of integration of production, arrangements had been made to take increasing quantities of gas from coke ovens. They had been told that in a comparatively short time the West of Scotland alone would be taking up to 36 mill. cu.ft. per day from coke oven sources.

'Having to rely for our supplies on an industry over which we have little or no control is something which I view with more than a little concern. The prime object of the coke oven industry is the production of hard coke, and gas is merely a by-product. What, then, will be the position if the demand for hard coke falls short of supply? Will the coke ovens maintain production merely to meet the requirements of the Gas Board? I appreciate that binding long-term contracts will have been entered into between the Gas Board and the proprietors of the ovens, but economic circumstances must in the long run determine the output of any industry or business.'

Mr. Mitchell added that no doubt arrangements were being made to retain those C.W.G. plants which were suitably located, and to build new and possibly different types of gasmaking units in strategic positions, any or all of which could be used in the event of a temporary or permanent cessation in supplies from coke ovens.

Heavy Outlay

'This safeguard will entail the expenditure of considerable sums to maintain these stand-by units in first-class condition and able to produce gas at very short notice. Skilled operators will require to be maintained on the Board's manpower strength and, in addition, considerable capital will be tied up in coke and oil stocks. How do these charges, both capital and revenue, affect the overall economies of the coke-oven supplies?'

Another important consideration was the possibility of a failure in supply due to trade disputes. The gas industry was singularly free from troubles of this nature, and in no instance had the supply failed anywhere in this country through strike action on the part of gasworks personnel. Did coke oven plant operators have the same high sense of public duty? This could only be proved in the light of time and experience.

'I know,' Mr. Mitchell concluded, 'that I am not alone in my concern for the future, and particularly the fact that we are to be so reliant on the coke oven industry.'

Mr. T. A. Ross, Arbroath, pointed out that many of the medium-sized undertakings that would cease production were at present quite efficient units, and they could be more efficient if many of them were working nearer to full capacity. He suggested that some of these undertakings should be kept in production, supplying gas into a grid main, and that they could be used as testing stations for various types of coal—at least until they were completely worked out or until it was too costly to continue using them. 'Mr. Ricketts,' he added, 'has said

Mr. H. R. Hart; Lord Mathers; Mr. D. D. Melvin; and Dr. McDavid.

Mr. Nicol Baird (General Manager, Central Division); Dr. McDavid; Ex-Provost Bruce; and Mr. Charles Murdoch.

nothing about what happens to an undertaking after it ceases production. Is it forgotten about? Some that have already ceased production look very much as though they have been forgotten about. They are definitely no advertisement to the gas industry.'

Mr. Ross complained that in some cases the local authorities concerned, the large consumers, and the Gas Board's own employees, did not know in advance that production was to cease in their district. They might read about it for the first time in the local paper. It had already happened. 'The local authorities are running the town. They should know. After all, we are always trying to get gas into their new houses. I wonder how many of our consumers changed over to electricity because the local gasworks was closing down. Bakers and others are left wondering where they will get their coke in future and if they will have to pay extra carriage on it. Do you wonder that some of them start thinking about other fuels, such as oil? Some of our younger employees are getting other jobs, and replacements are very difficult as no one wants to join an industry that is closing down its works. These things should be cleared up without delay, and the people concerned should know what is happening.'

Combined Works

Mr. J. Campbell, Production Engineer at Galashiels, Hawick, and District, asked if, in the choice of production stations, consideration had been given to combined gas/electric power stations designed to make full use of hot waste gases, surplus steam, mutual water cooling systems, mutual water treatment plants, special low transmission cost electrical tariffs, maintenance workshops, etc? Was there, he asked, any possibility of any of the main feeder pipes in the grid becoming multipurpose to convey, say, gas, oil, coal slurry, etc., at predetermined hours of the day and so be sources of revenue, or at least a means of reducing costs? Should natural gas become available in appreciable quantities over the border, where was it envisaged that it would be fed into the Scottish grid system? Mr. Ricketts had stated that liquefied petroleum gases were suitable for peak loads, but was it not considered that they might in some cases be used profitably in the small uneconomical isolated works which could not be integrated?

Mr. D. J. Colvin, General Manager of the Area Maintenance and Construction Department, said that the plan of integration was of necessity a fluid one, capable of undergoing modifications and alterations as construction proceeded. Moreover, it was difficult, if not impossible, to so plan procedure as to ensure that the programme of work was not subjected to delays caused by weather conditions and other difficulties beyond control. The proposed programme was a vast one, and its translation into miles of main actually laid and works closed down was a tremendous undertaking. It might be, therefore, that some works scheduled to close down within the next five years would be required to continue production for a longer period, or, equally, that works due to close at a later date might, due to alterations in the scheduling of various sections of the integration plans, cease production earlier. But whatever happened, it was essential to improve efficiencies of manufacture, with carbonising plants costing what they did to-day.

Improvement Possible

Their first task was to survey small works. Up to the present they had surveyed and reported upon some 30 small gasworks, situated in all parts of the Board's area of supply. As was only natural, conditions varied greatly between one district and another, but he had no doubt whatever that a considerable improvement in manufacturing efficiency—and consequently in the quality of the gas produced—coupled with a reduction in manufacturing costs, was feasible in many small works. Geographical considerations in Scotland precluded the complete elimination of the small works, no matter how desirable this might be. It was therefore of the utmost importance to achieve and maintain the highest possible standard of production efficiency in these small isolated units, and the maintenance and construction department could and must play its part in bringing this about.

'Our assistance and advice,' added Mr. Colvin, 'are now available to managers of small units, and I hope in due time to enlarge the scope of our activities in these and in other directions. The provision of assistance will be a service gladly given, and I hope freely called upon. But the Lord helps those who help themselves, and the managers of small units, recognising the truth of this, will no doubt themselves take every possible step to ensure that the efficiency of the plant on the works for which they are responsible is maintained at as high a level as possible.'

Mr. T. W. Aiken, Sales Director of the Bryan Donkin Co. Ltd., Chesterfield, said that Mr. Ricketts had mentioned transmission pressures of 300 lb. per sq. in. upwards. They all knew that other countries operated systems at higher pressures than this, principally natural gas, but they had very little experience in this country of controlling manufactured gas at these pressures. It was probable that high-pressure grid mains generally would not be routed through towns or populated areas, and the high-pressure would have to be controlled on the outskirts of any area to be bulk supplied. The initial pressure would, of course, be subject to variations between the limits of, say, from 50-400 lb. per sq. in. over the length of the system, and this pressure could be reduced and controlled in one stage to feed holder stations on a volumetric basis without any difficulty. To take full advantage of the high-pressure system, it would probably be necessary to supply villages, farms, and isolated properties with gas direct from the grid—inlet pressures 50-400 lb. to the sq. in., outlet pressures 4 in. W.G. The actual design difficulties of a pressure controller to meet these conditions were in connection with distortions of the regulator body due to high-pressure variations of inlet pressure and porosity of seating arrangement. Successful prototypes had been developed and were awaiting tests on a full scale under actual gas conditions, which conditions were not yet available.

More Research Needed

Mr. S. Paterson, Glasgow, said he did not think they had sufficiently investigated the flexibility that could be had with modern C.V.R. plant; nor had they truly explored the mobility that they could have in labour. He felt that a lot of their problems regarding stand-by plant could be answered in this way. 'It is a little pointless to me,' he added, 'to think of building a water gas plant when you have just closed down a coal gas plant. I feel that we have not really got all the answers.'

Mr. D. Marshall, Leven, expressed some anxieties on the ground of national defence if the gas system for a large extent of the country was integrated.

Dr. Burns, in a comment on the fundamental principles of integration, said that integration implied two things—the interlinking of one station with another, and the integration of the gas supplies from these interlinked stations. The first question was: Why bother to interlink? It was purely a question of economics. It was a relatively simple sum to work out whether it paid to interlink A with B. The principal factor was the cost of gas production at each individual station, and that depended on the cost of raw material into the two different systems.

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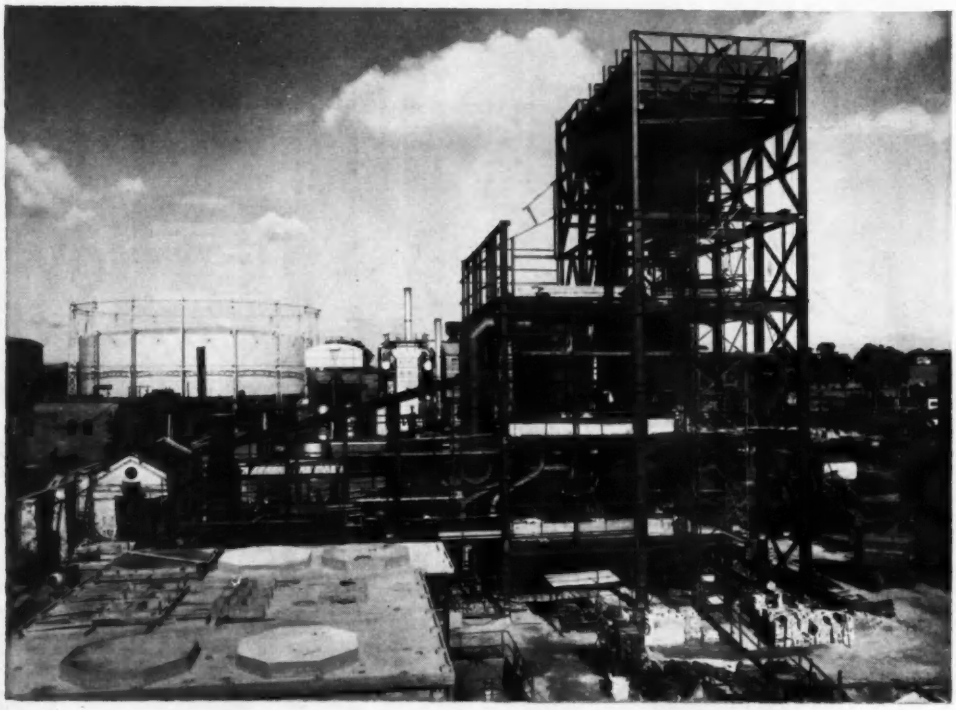

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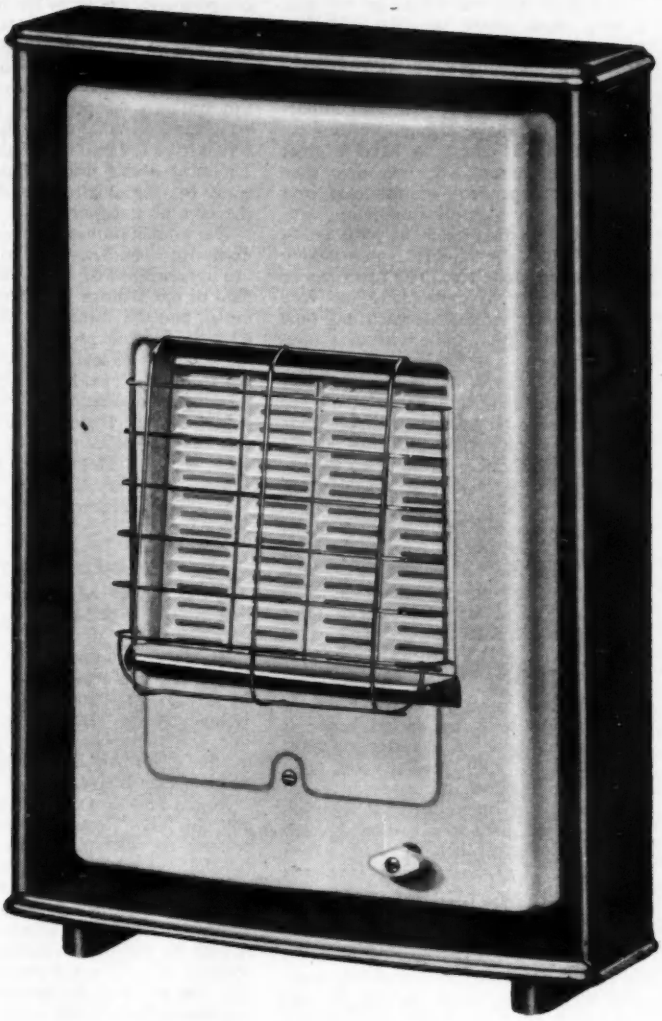

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What was not so easy to work out was the saving that could be effected, taking into account that one could get by with a very much lower stand-by. If they came to the conclusion that it would pay to interlink on the production costs, then it would certainly pay on the other. The method of interlinking was also important. The technique of high-pressure gas distribution was going to have a great importance indeed. At one time they were very dependent on the cast iron main, but now high-pressure mains, with the protection that could be afforded to them, were a possibility. Interlinking also implied a control. The functions of that control room were many and very important. It should tell each day how much should be required in that integrated system.

Replying to some of the points raised in the discussion, Mr. Ricketts referred to dependence on coke oven supplies. It was right, he admitted, that they should give a lot of attention to that; it was right that they should go on with it. There was a big iron and steel programme under way, and the coke ovens were necessary to it. The two things should marry in. After all, the Scottish Gas Board was not so reliant on coke oven supplies as was the case in most other coke oven areas.

Low Maintenance Costs

It was not essential, he went on, to have brand-new plants in all cases; it was amazing how long a water gas plant would go on with regular care and attention. The cost of maintenance was very small. Remarkably little interference, he said, had been caused through strikes. Mr. Mitchell had been 'depressed' by the mining industry's strike record, but in the case of the Scottish Gas Board the N.C.B. represented 1 mill. cu.ft. per day of the whole 36 mill. On national defence, he assumed that what was meant was that they must plan the location of gas making stations. He would point out that the grid system meant that they had a feed either coming in from this way or that way, with feeder stations coming in all along the route.

'I agree that if you hit a high-pressure steel pipe with a bomb you do get a big bang, but if a station is hit you get another big bang, and a pipe is very much easier to repair. As for dependence on oil—'We are not depending on oil; we have not come to any decision regarding oil as yet.'

As for Mr. Ross's point, if works could be made efficient, they would not be shut down. Thought had been given to the idea that closed-down stations could be used as testing stations. But if they had a testing station, they needed skilled personnel and they were in very short supply, and could not be spared for small works. It was far better to take these tests where they had suitable technical assistance. Board employees, he thought, were given adequate notice of intention to close down any works, and he did not see why a local authority should not be given information at the earliest possible moment.

Regarding the suggestion of combined gas/electric power stations, thought had been given to that but the cost of any gas produced would be far too high. As for multi-purpose pipelines, he would not like to put coal slurry through a steel main. Where would they feed natural gas from England into the Scottish system? 'I prefer to think, if gas was found this side of the border, where would it be fed into the English system?' The snag about using liquid petroleum gases for the small isolated works was the cost of transport.

The presentation of a silver salver was made to Mr. James Hall, Glasgow. 'In appreciation of his services as Chairman of the Scottish Gas Technical Committee and the immensely valuable work he performed in promoting and furthering technical education in the gas industry from 1927 to 1957.' Mr. Gledhill made the presentation.

Mr. George Hannah, New Cumnock, was elected President of the Association, with Mr. A. McFadyen, Glasgow, as Senior Vice-President and Mr. W. S. Johnston, Glasgow, as Junior Vice-President.

Cocktail Party

It was announced that the next annual meeting would be held in Ayr in September, 1958.

At the conclusion of the meeting the members were entertained to cocktails by Mr. and Mrs. Stanley Bennet and Mr. William Foster. In the evening a reception and dance were held by invitation of the Chairman and Members of the Scottish Gas Board.

At the President's lunch earlier in the day, Mr. D. Fulton, Helensburgh, expressed the Company's thanks to Mr. Gledhill, and continued:

'Change is the order of the day, and this Association has not escaped changes which seem to me to affect its existence. It may be that Associations such as our Scottish Association have served their day, and that the changes consequent on the nationalisation and major reorganisation of the industry make it impossible for them to continue in the fashion to which we older people have been accustomed. But we may be permitted a nostalgic sigh as we remember chapters in the history and men of ability and individuality of which and of whom we may well be proud.

'The mention of the word individuality brings a reflection that since nationalisation the rank and file of the Association has had less and less say in the conduct and proceedings of the Association. That may well be the fault of the rank and file, but it does seem to support the contion that there is a certain danger of failure to encourage or foster individuality. That would be a serious matter as without people of strong personality, enterprise and ambition will not flourish.

Further Proof

'A further proof of a pedestrian outlook and a spirit of it-doesn't-matter is to me the reliance placed in recent years on the executive at headquarters for the papers presented at the meetings. No criticism of the executive or the quality of the papers is implied or intended. But as an onlooker I shall dare to mention the far from uncommon impression among the rank and file that the executive and the senior officials wish to reserve to themselves the right to prior publication of any new experimental work or the employment of novel forms of plant under the Board's auspices.

'However that may be, my whole point is that the ordinary members are lying back and leaving it to those others. If any think those remarks out of place, I can plead only as excuse that they are sincere and are given voice in the hope that those who are entrusted with the leadership of the Association will give heed and by deep thinking and vigorous action so remodel the constitution and activities of the Association that a new strength and virile spirit may be breathed into the fabric and, reviving former glories, maintain and enhance the prestige of the Association. It can be done with a strong will and imagination.

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Brickwork Construction and Maintenance in Shell Type Boiler Installations

By A. R. Myhill, F.R.I.C., M.Inst.GasE., M.Inst.F.

ALTHOUGH the trends of modern methods of gas manufacture are such as to favour the adoption of waste-heat methods of steam generation, there are still considerable numbers of small to medium sized boiler plants in use in gasworks, which are of the shell type, burning solid fuel, often using natural chimney draught. The notes given below relate mainly to boilers of this class, but the principles enunciated may be taken as applicable to a greater or lesser degree to most other types of boiler, including waste-heat, gas-fired, water tube and fire-tube patterns, using natural, forced, or induced draught.

Probably the most common form of shell boiler is the conventional Lancashire pattern, which may be installed with special grates for dealing with particular kinds of fuel, such as coal slack, coke, or breeze. Even with comparatively small boiler plants, faulty construction and indifferent operation can lead to surprisingly high costs. The most obvious source of loss is the wastage of fuel in a thermally inefficient system.

Added to this may be increased capital and repair charges due to the boiler and its ancillary equipment wearing out before it should do. There may also be other costs due to difficulties in carrying on those processes which require steam during times of shut down for repairs and renewals.

Badly neglected boilers may operate at below 60% thermal efficiency when, with proper attention, a figure of 75% could easily be obtained. The difference of 15% in fuel consumption, with fuel at its present prices is a serious matter.

Important Efficiency Factor

A given weight of fuel is potentially capable of generating a definite, unalterable amount of heat during its complete combustion. The efficiency of the boiler depends on the proportion of such heat which is transferred to, and absorbed by, the water used in the production of steam. Such amount will depend on the exercise of scientific combustion control and on the means to ensure efficient heat transfer. One of the most important contributory factors to boiler efficiency is the effect of brickwork construction and maintenance.

Brickwork is something more than a mere support or housing for the boiler, and money spent on its correct design and subsequent maintenance is well repaid in the resulting saving of fuel. Brick flues, combustion chambers, chimneys and supporting members must be constructed in relation to volume of gases, pressure and draught conditions, heat transfer and heat insulation. The type and dimensions of brickwork must be related to prevailing temperatures at particular positions, and to the chemical and physical effects of the atmosphere (including dust content) in the furnace. Men employed as boiler bricklayers should be specialists, capable of appreciating the special requirements and the underlying principles of the work.

Some of the points which have to be considered are given below:—

(1) *Types of Material:* Constructional material comprises:—
- (a) Common red brick, yellow clay brick and/or partly glazed brick.
- (b) Concrete.
- (c) Refractory bricks and special blocks.
- (d) Insulating bricks.
- (e) Bonding and filling material.

Common, or red bricks are used as in ordinary house-building for constructional or supporting purposes only, and must not be used in positions where high temperatures prevail. The outer walls of the setting are generally constructed of red brick, which should be of good quality. Since all red bricks are porous to a very considerable degree, precautions should be taken to avoid ingress of air through the wall where the position is such as to be under chimney or fan pull. Any excess air drawn into the system in this way is a source of considerable thermal loss. Cracks in bricks should, for this reason, always be avoided or well sealed. Steps should be taken to fill in all pores, cracks and mortar joins on the outside of the setting. This is often done by applying two or three coats of good paint having substantial filling properties. In some cases outside walls are covered by mild steel sheeting.

Another excellent method is to have a 4½ in. thickness of white glazed bricks on the outside. Good glaze is impervious to air, and the plan has the great advantage of adding to the appearance of the boiler house and very considerably increasing the lighting of the room. Poor-quality glaze will 'craze' and lose a lot of its air-excluding properties after a comparatively short period of service.

Concrete is often used for foundations, which should be proportioned in accordance with the nature of the sub-soil. Special concretes are often used where foundations are likely to be exposed to rather high temperatures, and since serious temperature stresses may be induced in large concrete rafts, the sizes of individual units should be limited. Where temperatures are likely to be high, concrete should be protected by a 3 in. course of insulating brickwork. This will have the double advantage of preventing disintegration of the concrete and of conserving heat to the furnace. In a typical case it was found that the heat loss from this source was reduced to two thirds of that lost from uninsulated concrete, the concrete itself being kept several hundred degrees below what would be the case without insulation.

Damp sub-soils should be avoided whenever possible when building boiler foundations. Failure of bottom flue linings is common where precautions have not been taken to avoid dampness. Refractory bricks and blocks are obtainable in a great measure of variety according to the use to which they are put.

Degree of Refractoriness

Except in special locations, varying with the particular design of the grate and settings, the degree of refractoriness is not generally so high as would be required in certain other forms of gasworks construction, as, for example, producers of combustion chambers associated with retort heating. Provided the bricks will stand up to continuous work at 1,000°C., this is all that is required except in places where fireboxes or combustion chambers have walls which are directly exposed to direct and close radiant heat from the fire, particularly where such walls are in contact with solid fuel or ash, whether static or entrained as dust in the gases. In these cases, only the best quality material must be used, which needs to be specially resistant towards slagging reactions with the ash components. One of the most suitable materials for such positions is Scotch firebrick containing over 40% of alumina. This is rather expensive, but well worth the extra cost. When experience has been gained with a particular installation, it is often possible to effect considerable economies in the purchase of brickwork. For instance, in some cases the temperatures in main flues and economisers may not exceed 600°C., and second grade materials, even good quality red brick, will often be found quite satisfactory for the job. The lower costs thus incurred in positions where it is safe to use such material will justify the higher expenditure which can be made on first class insulating brick for lining and covering purposes, and on high quality refractory brick for special locations.

As regards heat-insulating bricks, their satisfactory performance depends mainly on their porosity. For a given material, the higher the ratio of pore space to total volume, the higher

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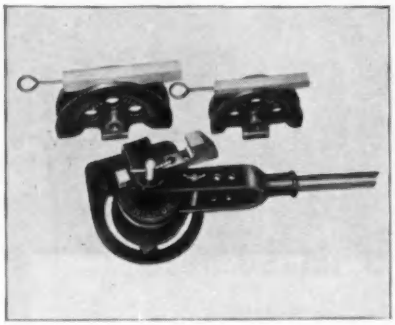

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will be the insulating value. It follows, unfortunately, that the best insulators are the weakest in mechanical properties. It is therefore necessary in many cases to compromise between good thermal insulation and reasonably high mechanical strength. Since insulating bricks as a class are considerably weaker than either refractory bricks or red bricks, the setting should be so designed that undue strains are not imposed upon them, either from weight alone or from expansion and contraction of surrounding structures. All direct thrust should, as far as possible, be taken by stronger material.

The provision of insulating bricks and their positioning in the setting is a matter for expert consideration in particular cases. Various combinations may be visualised. As an example, the side walls of a Lancashire boiler may be built of 4½ in. of firebrick on the inside, with a wall of 4½ in. insulating brick next, and a 9 in. wall of red brick on the outside. The bonding of bricks of one type into those of another, or the absence of bonding, are matters which can only be decided for individual cases. In another typical case, the 4½ in. firebrick wall might be bonded every fourth course into a 9 in. red brick wall covered on the outside by fibrous lagging.

Thin Brickwork Joints Essential

All brickwork joints, particularly in refractory work, should be made as thin as possible on account of the lower refractoriness, lower mechanical strength, and greater porosity of the jointing material as compared with the bricks. On this account, bricks should not be passed as satisfactory which are not true to size and unwarped, otherwise a thin joint is impossible.

Conservation of heat in a boiler installation is brought about, as in all other efficient heating operations, by reducing the losses due to radiation, conduction, and convection, and good practice involves attention to these three points. Radiation and conduction losses are related to the construction of the setting, rather than to maintenance of operating conditions, since they are avoided by the use of insulating material. Convection losses, which, for practical purposes, may be looked upon as wasted heat going up the chimney, may be very great in a badly operated installation. Such losses can be considerably reduced by adopting the principle of keeping gas volumes, including air admission, as low as possible, consistent with securing complete combustion of the fuel in the position where combustion ought to take place. The closer one can keep to the use of the theoretical volume of air necessary for the complete combustion of the fuel, the lower will be the volumes of gases passing over the fire-bed and away to the chimney. These gases should, in a properly designed installation, transfer a high proportion of their heat content to the water. If, however, the gas volumes are abnormally high, as will be the case where air has been admitted prior to combustion in excess of the requirements for complete combustion, considerable quantities of heat will pass away to the chimney instead of being absorbed in heating the water. The quantity of air used can, and should, be regulated by dampers, but proper regulation by these means may be largely nullified if uncontrolled amounts of air are allowed to be indrawn through faulty brickwork.

All boiler furnaces of the Lancashire type whether consuming coal, coke, oil, gas or other carbonaceous fuel, are dependent on the heat of combustion of carbon and hydrogen, so that the proportion of carbon dioxide in the chimney gases will be a measure of the closeness of approach to the theoretical amount of combustion air. If the fuel consisted of pure carbon, the percentage CO_2 in the combustion products would be 21, supposing the air admitted were the theoretical amount for complete combustion; the remaining 79% being nitrogen. In practice, of course, we do not burn pure carbon, and different fuels require different proportions of air for their complete combustion, and, with theoretical air supply, will produce products containing different percentages of CO_2. These percentages can be calculated from the ultimate analysis of the fuel.

Fuel	*% CO_2 for theoretical perfect combustion*
Coal	18-19
Coke	19-21
Coal gas	12-14
Producer gas (from coke)	19-21
Blast furnace gas	24-25

As examples, the theoretical percentages of CO_2 obtainable from various types of fuel are given in the table. The percentage of CO_2 is calculated on water-free gas, the figure being, for all practical purposes, that given in a conventional 'Orsat' analysis.

It is not normally practicable to operate a commercial boiler furnace to burn fuel efficiently with only sufficient air to satisfy theoretical requirements, and the amount of excess air will depend on many factors, including design of furnace, stoking arrangements (manual or mechanical), type of fuel used, including volatile matter content and size grading, etc. With good working, the quantity of excess air might be, say, 30% of the theoretical amount. Attempts to reduce excess below this amount may result either in incomplete combustion of the carbon in the fuel, so that potential heat will be wasted as carbon monoxide in chimney gases, or a sufficiently high rate of combustion may not be obtained, resulting in deficiency of steam from the boiler. There is always, therefore, an optimum value for proportion of CO_2 in the flue gases for any given fuel type consumed on a given installation.

Any excess air will lower the thermal efficiency, and modern boiler plants are always equipped with CO_2 recorders, the boiler operator being instructed to work to a pre-determined value. Experience may show with a particular boiler, for instance, using coke firing, that, say, 12-14% CO_2 is the best all-round figure to aim at. Although it is true, within limits, that the lower the percentage of CO_2 in the chimney gases, the lower will be the thermal efficiency, this statement needs qualifying. Strictly speaking, it relates only to cases where dilution with excess air has been brought about by admitting such air to the fire bed, and the sample of gas, if required for this purpose, should be taken from a position as close as is practicable to the exit from the combustion zone itself. There are cases, however, in which excess air has entered after combustion has taken place, at a position where the products are comparatively cool, having given up the bulk of their heat efficiently in generating steam. Such a position may be near to the base of the chimney, and its admission may be accidental or, in special cases beyond the scope of the present article, deliberate. It is obvious that in such circumstances a low CO_2 figure in gases taken after the position of such extra air entry might not necessarily indicate poor thermal efficiency. It is essential to know, however, whether excess air has been admitted before or/and after entering the fire bed, and whether any air admitted afterwards has been accidental or deliberate, for a particular purpose. It is important to realise that uncontrolled admission of air through faulty brickwork or ironwork is a bad thing, whether such air enters before or after the combustion zone.

Air Leakage Through Brickwork

If before combustion, heat is carried away in the products passing up the chimney. Leakage at any position, either before or after combustion, may seriously interfere with draught regulation by overloading the chimney or fan. Between the inlet and outlet of the complete boiler flue system, there is a pressure difference which may amount to only a few tenths of an inch W.G., or which may be considerably higher. This pressure difference constitutes the motive power which moves the air and gases through the system. Frictional resistance of flues, bends and ancillary apparatus such as superheaters and economisers, will absorb part of this motive power, as will also depositions of ash, soot, dust, clinker or fluxed refractory material. By keeping all air- and gas-ways clear of such deposition, and by designing the setting with the minimum amount of bends and restrictions, so as to avoid the necessity of high pressure differentials, the system may be relieved of overloading by unnecessary air.

Where there are indications that excess air is passing, as will be indicated by gas analysis, high fuel consumption and poor steam-raising abilities, it is useful to know the probable positions where leakage is likely to occur. Assuming one is satisfied that everything has been done to avoid general air infiltration through the pores of bricks and mortar, there are certain places which should be specially examined. These include damper fitments, joints in bonding bricks, warped doors and frames of ash doors, inspection and cleaning plates, economisers which incorporate scraper gear, blow-down recesses, etc. A fairly frequent source of trouble is leakage at the joints between the boiler shell and front cross-wall.

Observations of local differentials of pull or pressure at various points in the setting will give clues to the positions of leakage as well as of partial flue restriction by ash, etc.

Eastern Juniors Hold Presidential Meeting

LINCOLN formed the venue of this year's Presidential Meeting of the Eastern Junior Gas Association on September 21 when members and their ladies gathered to honour their President, Mr. J. L. Ireland. At the business session, held at the National Farmers Union headquarters, Mr. Ireland received the insignia of his office from last year's President, Mr. E. S. Dennis (Colchester), and gave his Presidential Address, to be published in a later issue of the 'JOURNAL.'

Effecting Economies

The theme of the address was the way in which working economies could be effected in works manufacture, distribution, sales and service, and accountancy. The topicality of this theme in view of the bank rate going up was commented on by Mr. W. F. Pritchard, Senior Vice President, who, proposing a vote of thanks to the speaker, said that at the present time the need for economy could hardly be stressed too strongly. The paper showed how economies could be made in a variety of ways and he mentioned, in particular, the references made to a saving of town water and to sulphur removal. If the paper made them all look around and search for ways in which economies might be effected in their own spheres of activity, it would have served a useful purpose; an effort to reduce telephone accounts might provide a good starting point.

Virile Association

Later in the meeting Mr. Dennis was presented with an illuminated address to mark his term of office as President of the Association, and it was agreed to donate a sum of ten guineas to the I.G.E. Benevolent Fund.

Lunch, at the invitation of the East Midlands Gas Board, was held at the Saracen's Head Hotel. Proposing the toast of the Eastern Junior Gas Association, Mr. Bernard Clarke, General Manager of the Lincolnshire Division, remarked that although it was the youngest association it was as virile as any other and was an integral part of the industry. Membership was by no means limited to engineers, but included representatives from the fields of distribution and accountancy. He applauded Mr. Ireland's choice of economy as a theme for his address which he felt had confirmed the Association's confidence in him.

Responding, the President spoke of Mr. Clarke's championing of the Juniors, which had contributed to the increase in the Eastern Juniors' membership in the Lincolnshire Division. He was very conscious of the support given to the Association by the East Midlands and Eastern Gas Boards.

In proposing 'The East Midlands Gas Board,' Mr. Pritchard said that he had a bias in favour of the Lincolnshire Division and proceeded to extol the peaceful, rural amenities of the county, including a parody of 'The Brook' in which the Abbey Garden appeared as a decidedly less attractive habitat.

Unremunerative Main

Although appreciative of Mr. Pritchard's poetic remarks, Mr. R. S. Johnson, M.B.E., Chairman of the East Midlands Gas Board, who replied, appeared more concerned about the division's 'miles of unremunerative main.' The Board's task, he said, was to beg, borrow, or even steal a cheaper therm. The work done by the various associations was valued because of the good ideas produced which contributed to the achievement of that aim.

Later, members and their ladies visited Lincoln Cathedral and Castle and were entertained to tea at the Eastgate Court Hotel.

In addition to Mr. Johnson, the meeting was attended by Mr. E. H. Harman, Deputy Chairman of the East Midlands Board.

To readers of 'Gas Journal'

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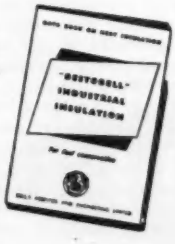

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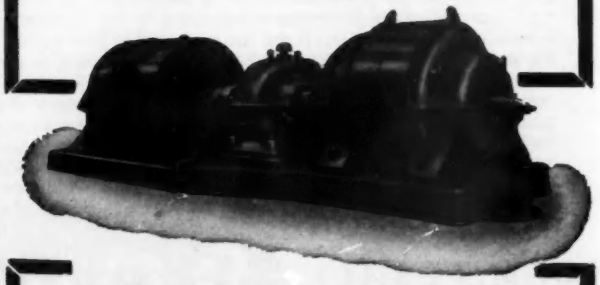

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The " Gas Journal " is published every Wednesday, price 1/6d.; by post 1/8d.

Subscription Rates : Home 65/– ; Overseas (from Sept 1, 1957) 72/6 per annum ; (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 2/6 per line (approx. 7 words)—minimum charge 10/–. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10 in. deep × 7 in. wide; block screen 120.

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CONTRACTS OPEN

THE URBAN DISTRICT COUNCIL OF HAVANT AND WATERLOO invite TENDERS for the supply of approximately 110 Bath Gas Water Heaters and 138 Sink Gas Water Heaters.

Conditions of Contract may be inspected at the office of the Engineer and Surveyor, 1, Park Road North, Havant, from whom the Specification, Quantities and form of Tender may be obtained.

No Tender will be received except in a plain sealed envelope which may bear the word " Tender " followed by the subject to which it relates, but shall not bear any name or mark indicating the sender.

Tenders must be delivered not later than 12 noon on Wednesday, October 16, 1957, to the Clerk of the Council, Town Hall, Havant.

The Council do not bind themselves to accept the lowest or any tender.

APPOINTMENTS VACANT

NORTH EASTERN GAS BOARD

YORK-HARROGATE GROUP
WHITBY GAS WORKS
TECHNICAL ASSISTANT

APPLICATIONS are invited for the above position at a salary within Grade A.P.T. 7 (Provincial ' A ') (£705-£785 per annum) of the Salary Scales agreed by the National Joint Council for Gas Staffs.

Applicants should possess the Higher National Certificate in Civil Engineering (Gas Engineering) or equivalent qualification, and must be capable of taking charge of the Works under the direction of the District Engineer and Manager.

They should have experience in the operation and maintenance of manufacturing plant (especially machine charged horizontals) and in the control of labour.

The successful applicant will be required to pass a medical examination and to join the Board's Staff Pension Scheme.

Applications, stating age, experience, training and qualifications, should reach the Group General Manager, North Eastern Gas Board, York-Harrogate Group, 48, James Street, Harrogate, by October 23, 1957.

J. C. GARDNER,
Secretary.

(*Classified advertisements continued on page* 48)

APPOINTMENTS VACANT (ctd.)

SALES REPRESENTATIVE: Manufacturers of Gas-heated Washing Appliances require Sales representative to cover the Scottish Gas Board Area. Resident in Scotland and able to drive. Car provided. Apply stating age, experience and salary required to No. 331, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

SCOTTISH GAS BOARD

NORTHERN DIVISION
SENIOR ACCOUNTING ASSISTANT

APPLICATIONS are invited for the position of SENIOR ACCOUNTING ASSISTANT.

Applicants should have a recognised accountancy qualification and sound experience of general office routine and organisation, with the ability to control staff. Costing experience will be an advantage.

Commencing salary will be within Grades A.P.T. 10/11 £860 to £1,020 per annum with placing according to qualifications and experience.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Application stating age, and giving particulars of education, training, experience and qualifications should be addressed to the undersigned within ten days of the appearance of this advertisement.

H. S. MILNE,
General Manager.

50, Cotton Street,
Aberdeen.

September 26, 1957.

SCOTTISH GAS BOARD

EDINBURGH AND SOUTH-EASTERN DIVISION

APPLICATIONS from qualified accountants are invited for the following positions on the staff of the General Manager at Divisional Headquarters in Edinburgh:—

1. SENIOR ACCOUNTANT. Applicants should have considerable knowledge and experience in modern accounting methods and be interested in their application and development in a large-scale organisation. In addition the applicant must have the ability to control and organise accounting staff. Salary Scale Group 'B' of the National Salaries Table for Senior Officers £1,155-£1,315 per annum.
2. COST ACCOUNTANT. Applicants should preferably be members of The Institute of Cost & Works Accountants and have considerable knowledge of costing and stores accounting and will be required to develop costing and stores accounting in the Division. Salary Scale Group 'A' of the National Salaries Table for Senior Officers £1,075-£1,195.

Both appointments are pensionable and the successful applicants will be required to pass a medical examination. The commencing salary will be in accordance with qualifications and experience.

Applications stating age and giving particulars of education, training, qualifications and experience should be sent to the undersigned within 14 days of the appearance of this advertisement.

A. T. HERD.
Secretary.

26, Drumsheugh Gardens,
Edinburgh.

September 24, 1957.

GAS COUNCIL: Applications are invited from qualified accountants for the appointment of an ASSISTANT in the Chief Accountant's Department of the Gas Council. The commencing salary will depend on the qualifications and experience of the successful candidate but will not be less than £1,075 a year. The appointment will be subject to membership of the Gas Council Staff Pension Scheme and the successful candidate will be required to pass a medical examination. Applications giving details of age, qualifications and experience should reach the Secretary, The Gas Council, 1, Grosvenor Place, London, S.W.1, not later than fourteen days from the appearance of this advertisement.

NORTHERN GAS BOARD

DARLINGTON DIVISION
TECHNICAL ASSISTANT (PRODUCTION)

APPLICATIONS are invited from suitably qualified persons for the above vacancy at the Darlington Unit.

Duties of the post include the control of continuous vertical retorts, carburetted water gas, and ancillary plant.

The minimum grading for this post is Provincial 'A' Grade A.P.T. 5 (£605-£685), but the Board reserve the right to place the occupant, either at the time of appointment or later in Grades A.P.T. 6/8 (£640-£825), should his qualifications, experience or performance of the duties of the post merit such higher grading.

Applicants should have completed their National Service. The post is pensionable and the successful candidate will be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees should be received by Mr. Charles Hindle, Sub-Divisional Manager, Gas Offices, John Street, Darlington, not later than October 19, 1957.

F. WILSON,
Divisional General Manager.

NORTHERN GAS BOARD

TEES-SIDE DIVISION
TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT at the Stockton Unit.

Applicants must have had experience in Drawing Office and Laboratory. Experience in Continuous Vertical Retort Plants desirable but not essential.

Salary will be within Grades A.P.T. 5/6 (£605-£720) of the National Salary Scales.

The post will be pensionable and the successful applicant will be required to pass a medical examination.

Applications giving full details of age, education, qualifications, and experience, together with the names of two referees, should be addressed to reach the undersigned not later than Monday, October 28, 1957.

JOHN W. PALLISTER,
Divisional General Manager.

Northern Gas Board,
Tees-Side Division,
Post Office Box No. 4,
Commercial Street,
Middlesbrough.

September 25, 1957.

EAST MIDLANDS GAS BOARD

NOTTS. & DERBY DIVISION
APPOINTMENT OF TECHNICAL ASSISTANT
LITCHURCH GAS WORKS, DERBY

APPLICATIONS are invited from suitably qualified persons for the post of TECHNICAL ASSISTANT at the Litchurch Gas Works, Derby. The commencing salary will be within Grades A.P.T. 5/6/7 (£605/£785) according to age, qualifications and experience.

Applicants should preferably be in possession of, or studying for, the Institution of Gas Engineers Higher Grade Certificate in Gas Manufacture, or equivalent qualifications. They should also have had practical experience on a modern gasworks, with special reference to continuous vertical retort practice and auxiliary carburetted water gas plant.

The positions are pensionable and the successful applicants will be required to pass a medical examination.

Applications, giving details of age, education, training, qualifications and experience, together with the names of two referees should be addressed to reach the undersigned not later than Monday, October 14, 1957.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts. & Derby Division,
P.O. Box No. 62,
Friar Gate,
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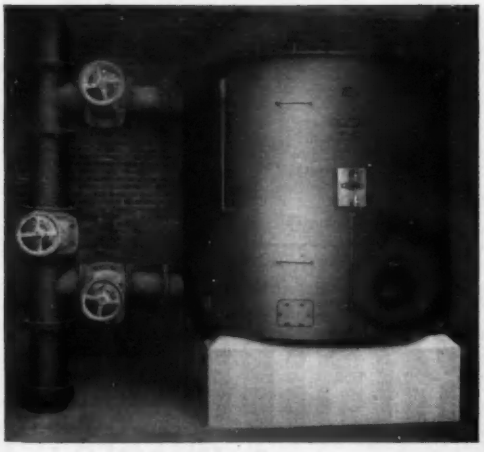

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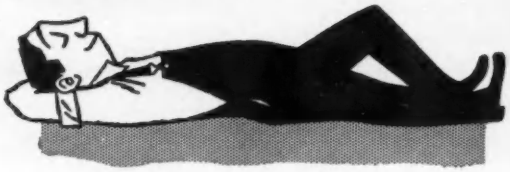

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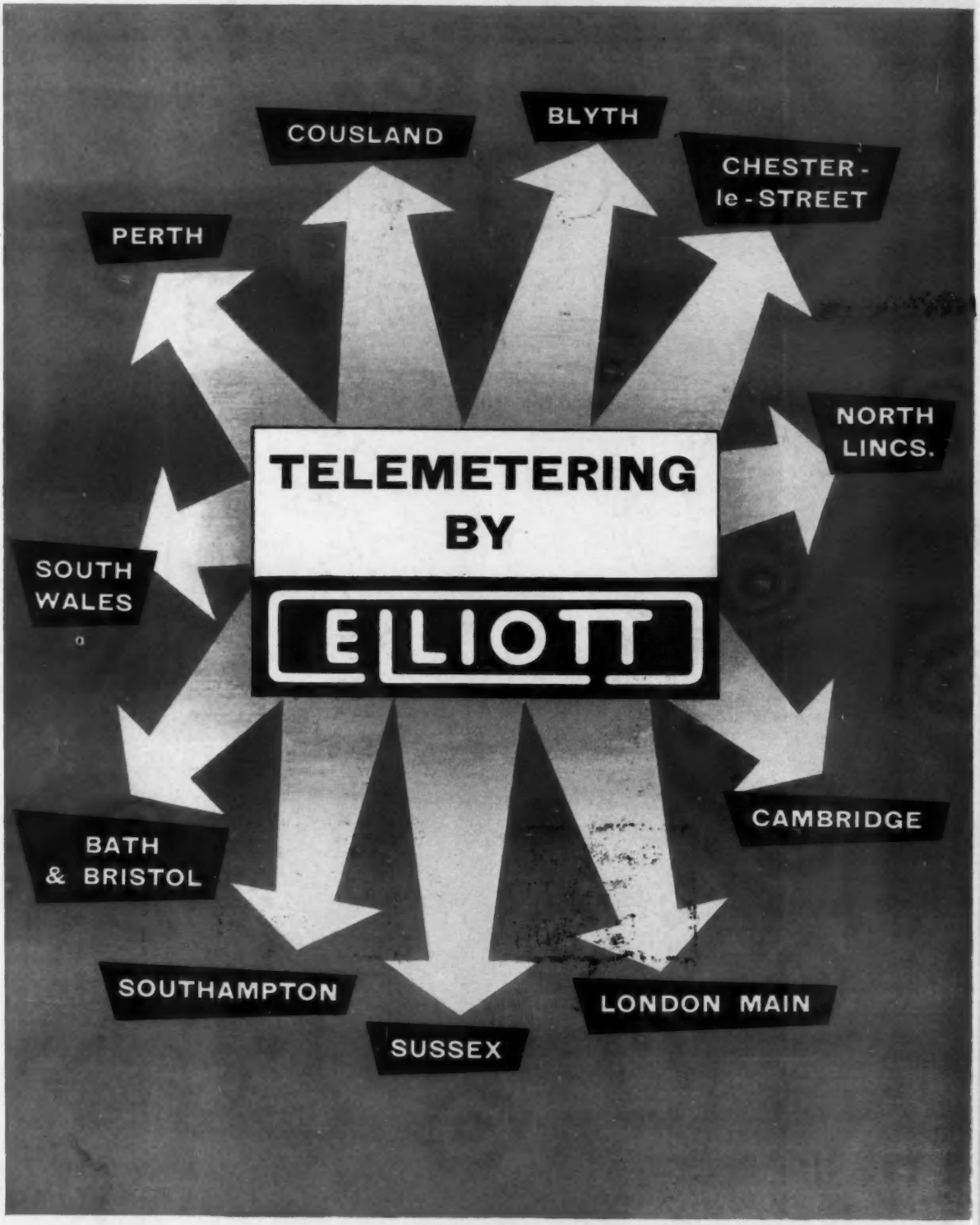

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